MYCOLOGIA

OFFICIAL ORGAN OF THE MYCOLOGICAL SOCIETY OF AMERICA

VOL. XXXV JULY–AUGUST, 1943 NO. 4

DOCTOR HOWARD ATWOOD KELLY

BESSIE B. KANOUSE

(WITH PORTRAIT)

The death of Doctor Howard Atwood Kelly brings to a close the long career of a scholar devoted to medical research and deeply interested in a large number of other scientific subjects. His interest in botany was manifest at the age of 16 years when he made a study of the plants of Delaware County, Pennsylvania. Later he became particularly interested in Mycology and Lichenology. While the demands made by his medical profession prevented him from doing exhaustive botanical research, he did find time for collecting, writing and maintaining an extraordinarily fine botanical library. He was the author of a volume entitled,[1] Some American Medical Botanists. He gave hearty support to the botanical investigations of others. He lent a helping hand to many students and scholars, especially in the field of Mycology, through generous gifts of important basic publications, contributions of funds for the support of research and for the publications of the results of research.

For 10 years Dr. Kelly had in his employ Mr. L. C. C. Krieger, an eminent artist and student of fungi. During this time Mr. Krieger assisted in securing what was probably the most extensive privately owned mycological library in this country. It contained 12,000 items and was valued at $100,000. In it were to be found many rare publications some of which were the only copies in the

[1] Some American Medical Botanists, The Southworth Company, Publishers. 1914.

[MYCOLOGIA for May–June (**35**: 259–381) was issued June 1, 1943]

United States. Dr. Kelly also obtained valuable old letters and manuscripts. The most noteworthy of those pertaining to botany were some of the letters of M. J. Berkley, Lewis D. de Schweinitz, and Charles H. Peck. He also acquired large numbers of illustrations of fungi and the library was replete with volumes of icones of fungi. Mr. Krieger made more than 300 exceedingly fine water color paintings of fungi for Dr. Kelly.

In 1928 Dr. Kelly presented his library, paintings and other gifts to the Herbarium of the University of Michigan. This has been designated, The L. C. C. Krieger Mycological Library and Collections. Included in the gift were collections of fungi made by Kelly, Krieger, Beardslee, Burlingham and others. In addition he gave a library of 400 items on the subject of Lichens which included important purchases from the library of Moritz Fünfstuck. Besides these there were exsiccati of lichens and fungi and a set of wax models of fungi.

Dr. Kelly was also actively interested in the field of zoölogy and was Honorary Curator of Reptiles and Amphibians in the Museum of Zoölogy of the University of Michigan.

Seldom does one find as gifted an individual as was Dr. Kelly. The results of his own research are immeasurable. However, his sympathetic appreciation of the needs of others working in scientific fields reflects no small part of his greatness. In his death not only the medical profession but his scientific colleagues throughout the world have lost a valued friend.

UNIVERSITY OF MICHIGAN

SCLEROTINIA CARICIS-AMPULLACEAE, A REMARKABLE SUB-ARCTIC SPECIES

H. H. Whetzel and W. G. Solheim [1]

(with 6 figures)

Most species of *Sclerotinia* on members of the Cyperaceae and Juncaceae appear to be restricted to the cooler areas of the north temperate zone. Very few have been described from the arctic and sub-arctic regions. One would expect them to be the most common pathogenic discomycetes in these cold areas, especially in sedges and rushes. Probably a goodly number of undescribed species on these suscepts in arctic and sub-arctic regions await the searchings of future hardy mycological explorers. It is, therefore, an especial pleasure to report a practically unknown species of this genus on *Carex,* discovered in and first described from Finland, and recently found to occur in a high mountain swamp in Wyoming.

In a letter of February 25, 1933, about three years after a collecting trip with him in Sweden, Dr. John A. Nannfeldt, of the Botanical Institute of Uppsala, wrote the senior author that he was sending "part of a collection (fig. 6) of a *Sclerotinia* on *Carex aquatilis,*" inquiring, "Is it *Sclerotinia longisclerotialis?*" The specimen, preserved in alcohol, arrived shortly. It had been collected June 25, 1932, near Lake Gärdsjön, Sweden by T. Lohammar. An examination soon disclosed that is was not *S. longisclerotialis,* but was, indeed, a splendid species, apparently undescribed. In replying to Dr. Nannfeldt it was proposed to describe it and name it in his honor.

[1] Acknowledgments: We are especially indebted to Dr. John A. Nannfeldt of the University of Uppsala for the first known collections of this *Sclerotinia* and for bringing to our attention its original description by Nyberg. We are beholden to Dr. C. L. Porter for the remarkable photograph of the fungus in its natural setting and to Mr. W. R. Fisher, photographer to the Department of Plant Pathology, Cornell University, who has made the other photographs. We are grateful to Drs. H. M. Fitzpatrick, David Linder and W. Lawrence White for their critical reading of the manuscript, even though we have not accepted all of their suggestions.

A year later, a letter was received from Dr. Nannfeldt, saying "Yesterday I received a large lot of discomycetes from Finland, collected by an evidently very clever amateur Mycologist, Mr. Wolmar Nyberg, bank director in Borgå. Among the fungi was rather abundant material of a species of *Sclerotinia* growing on *Carex ampullacea* Good (= *rostrata* Stokes = *inflata* Huds.). He added a very long and full description of it with the *ad interim* name, *Scl. Caricis-ampullaceae*. The finding place is a sphagnum bog on his own villa-ground, where it occurs every year."

Noting its similarity to the specimen he had sent the previous February, Nannfeldt said he was sending a part of the collection (FIG. 4) and a translation of Nyberg's description. These were presently received. He suggested that since the "finding-place" was so fortunately situated, fresh material could doubtless be obtained by writing Mr. Nyberg.

An examination of Nyberg's collection and a comparison of his preliminary description with the specimen Nannfeldt had first sent, left no doubt that the two were co-specific.

A letter to Nyberg on April 14, 1934, brought a prompt reply saying he would send fresh specimens as soon as they appeared. With a second letter, June 20, 1934, he sent cultures of ascospore shootings but they proved to be too badly contaminated to be of use. Due to the few apothecia appearing that season, no additional specimens were received from Nyberg, nor were further letters or specimens received from him in the years following. Thus the only material of the species from Finland which we have is that part of Nyberg's type collection (June, 1931) sent by Nannfeldt.

Enclosed in Nyberg's letter of June 20 was a reprint of a short paper in Swedish (**1934**) in which he had already, early in the year, described the species and given it the name *Sclerotinia Caricis-ampullaceae*.

A translation of Nyberg's published description follows:

"A species of *Sclerotinia* on *Carix ampullacea,* which I have not found described in the literature to which I have access, and which I have called *Sclerotinia Caricis-ampullaceae* n. sp.

"Found by me in Borgå parish, in a bog in the vicinity of my summer home. It grow from sclerotia formed in the crotch between leaf blade and culm of a dead *Carex* stand from the

FIG. 1. Apothecia in a mossy setting in the swamp in Medicine Bow Mts. June 1940. The apothecia are more usually found emerging from water. Approximately ½ natural size. Phot'd by Dr. C. L. Porter. The outside of the cups is powdered with tiny masses of pine pollen from nearby trees.

previous year, at 5–10 cm. depth under the surface of the surrounding white moss. Collected the first time in the early part of June, 1930, and every year since then at the same time. Older fruit bodies were found a few times in July.

"The *sclerotia* which lay loosely, or had fallen from the blade crotch are white inside, externally black, longitudinally sulcate, often coarsely granulate; at first firm, later soft and easily crumbling, straight; bowed or S-shaped, fusiform, with the basal end usually rounded, above gradually tapering and often drawn out to a thread-like apex; varying greatly in form; the length varying from 1–3 cm. to more than 10 cm.; in thickness from 1 mm. to more than 1 cm. There is much shrinkage on drying, hence these dimensions do not hold for dry specimens. On vigorous sclerotia there grow as many as 20 fruiting bodies, on weaker ones often but a single apothecium. Indeed the fewer the fruiting bodies, the larger they generally are if the sclerotium is of normal size.

"The *apothecia* are often funnelform at first, later cup-shaped, finally they are likely to be fairly flat, the surface being wrinkled and tuberculate, often with the funnel-shaped umbilicus, so characteristic of young fruiting bodies, still evident. They are generally about 2 cm. in diameter although the larger specimens may attain a diameter of more than 4 cm. The height of the cup itself is about that of its diameter when young, thickness about 1 mm. The outer surface of the cup is very finely tomentose. The color of the outer surface as well as the hymenium is of varying shades of brown, occasionally approaching a golden red. The consistency of the cup is thready, tough, sometimes fleshy. The cups are borne on cylindrical stipes 5–10 cm. long, 1–2 mm. thick, thicker above where they pass over into the cups, thickened at the base, darker than the cups, nearly black and coarsely tomentose. The upper half only, of the stipes, protrudes above the moss.

"The *asci* are cylindrical, obtuse and rounded at the apex, which is usually thickened, opening by a terminal pore which gives a weak blue iodine reaction at the very tip; dimensions 200–230 $\times$ 11 μ.

"The *paraphyses* are threadlike, scarcely enlarged at the tips, branching below, septate, of the same length as the asci, colorless, 1–2 μ in diameter.

"The *spores* are oval, 11–15 $\times$ 6.5–9 μ, hyaline, smooth, without oil drops, uniseriate in the upper part of the ascus.

"Without any distinguishing taste or odor."

DISCOVERY OF THE SPECIES IN THIS COUNTRY

During the winter of 1937–38, the junior author spent sabbatical leave as visiting professor in the Department of Plant Pathology

at Cornell University. During conversation one day, he described an unusually large and striking species of *Sclerotinia* on a species of *Carex*, which had been discovered by his colleague, Dr. C. L. Porter, in a swamp high in the Medicine Bow Mountains, near the summer camp of the science departments of the University of Wyoming. Sphagnum does not occur in this swamp but aquatic or semi-aquatic mosses grow in abundance among the *Carex* plants.

Early in January, 1939, the junior author sent to Ithaca, a part of the original collection (FIG. 5) made by Dr. Porter on June 18, 1937. As the senior author was then about to depart on a collecting trip to Venezuela, the specimen was set aside for examination and study upon his return the following May. Unfortunately a long siege in the hospital, after his return, delayed the anticipated study of the specimen.

Meanwhile the junior author made a second collection of the *Sclerotinia* in the same locality on June 26, 1939, and obtained ascospore cultures. In a letter of December 22, 1939 he wrote that he was sending these cultures to be followed later by dried apothecia of the 1939 collection.

Having partially recovered from a summer in the hospital, the senior author was able to return to his laboratory early in January, 1940. He immediately made a study of Porter's collection reporting in a letter of January 19 to the junior author, "Since writing you on January 9, I have found time to examine rather critically the specimen of that *Sclerotinia* of yours on *Carex* which you sent me preserved in liquid in January, 1939. I intimated in my letter of January 9, 1940, that this might be identical with a species I had from Finland some years ago. A preliminary comparison of your fungus with the Finland species seems to confirm my hunch." Following a short discussion of the marked similarities of the Finnish and Wyoming specimens and their slight differences, he remarked, "For the present, therefore, I am referring your species to *Sclerotinia Caricis-ampullaceae* Nyberg."

Shortly thereafter specimens of the June 26, 1939, collection together with a long letter (January 27) containing much pertinent information was received from the junior author. He reported that the *Carex* is "*C. aquatilis*," remarking "This is rather interesting since it is one of the species * * * that the fungus

occurs on in Sweden." He pointed out that this second collection he was sending confirmed the senior author's assumption that the larger end of the sclerotium fits into the crown of the diseased *Carex,* that it arises within the culm, breaking out below as it grows and matures, the long slender tip remaining embedded in the culm. Speaking of the place of collection he says, "The habitat is a typical swamp with an abundance of *Carex* and scattered willows. The *Carex* plants grow partially submerged in the water, and at the time of collection, the sclerotia were completely submerged. The apothecia emerge from the water at the time of discharge of spores." With the specimens and data now in hand there was no longer any doubt as to the specific identity of the Wyoming species with Nyberg's *S. Caricis-ampullaceae.*

However, there still remained many questions of special interest regarding the life history of this species and its possible occurrence on other species of *Carex* in this country. The senior author had planned to spend a month during June and July, 1940, at the University of Wyoming's summer camp in the hope that more complete data might be obtained on the infection of *Carex* by the *Sclerotinia* and on the spermatial stage and early developments of the sclerotia. Unhappily the trip had to be foregone. The junior author then wrote that he would undertake to make, during 1940, the collections and observations necessary to complete the picture of the seasonal developments of this *Sclerotinia.* The desire to obtain a likeness of the apothecia in their natural setting was gratified by the superb photograph taken by Dr. Porter (FIG. 1). New ascospore cultures were obtained. Visits to the locality were made by the junior author during June and July and again in early September and finally on October 14. From collections and observations which he made and sent the senior author, photographs of the spermodochidia [2] and of the mature sclerotia (FIGS. 2 and 3), as well as data on their development during the summer and autumn have been secured. No collections were made during 1941.

[2] For definition of this term and discussion of the spermatial fruit-body in species of *Sclerotinia* attacking members of the Cyperaceae and Juncaceae see Whetzel, Mycologia **35**: 335. 1943.

During June, 1942, the junior author again made abundant collections of the apothecial stage and obtained new cultures from the ascospores. He also again collected this species on *Carex inflata* Huds. (= *C. rostrata* Stokes). He had reported finding it (letter of Dec. 12, 1940) on what he took to be this species on October 14, 1939.

LIFE HISTORY OF S. CARICIS-AMPULLACEAE

The sequence of events in the seasonal development of this species parallels almost exactly that already described by Whetzel (**1929**: 26) for *S. longisclerotialis*. Apothecia do not appear and mature their ascospores for discharge until late June, but they have mostly disappeared by early July, their period of maximum spore discharge being correlated rather closely with maximum pollination activities of their *Carex* suscepts. Invasion is apparently *via* the male flowers as may be deduced from the fact that the male flower-spikes located above the female spikes are always the first to show the browning and dying which is finally evident in the culms in late July. The progress of the invading mycelium downward in the culms appears to be relatively slower than is that of *S. longisclerotialis,* due possibly to the lower seasonal temperatures of the sub-arctic environment. The spermodochidia (FIG. 2) do not mature and discharge their spermatia until late September or early October, whereas those of *S. longisclerotialis* are mature and functioning during late June and early July. Sclerotial development also is slow, the single large sclerotium formed in each infected culm (FIG. 3) being scarcely detectable before early October but maturing very rapidly thereafter. Mature sclerotia of *S. longisclerotialis* are frequently to be found in June in the swamps about Ithaca, N. Y. The sclerotia or *S. Caricis-ampullaceae* usually remain partially enclosed in the culm throughout the winter. The large rounded base is firmly bedded in the base of the diseased culm, being held in place by the stiff sheath of dead leaves. The long slender tip remains encased above, so that only the large lower half is exposed by the ruptured culm. It is from this exposed surface that the apothecia, usually several to many (FIGS. 4, 5, and 6), arise in fasciculate fashion. The lower part

of the diseased culms containing the sclerotia remain completely submerged or frozen in the ice during the winter.

The groups of spermodochidia when fresh and moist appear as black more or less tuberculate swellings along the upper half of the killed culm. When dry they are to be detected only as groups of parallel dark lines up and down on two faces of the shrivelled culms. They are arranged at intervals along the culm (FIG. 2) as in *S. longisclerotialis* and in *S. Duriaeana* though occasionally less regularly disposed. There can now be little or no question that the spermatia of this as well as those of the other species of *Sclerotinia* on *Carex* are functional, fertilizing in some way, as yet unknown, the then forming sclerotia in the culm below.

TECHNICAL DESCRIPTION

Although Nyberg's description, the translation of which is presented above, is perhaps sufficient to identify the species, there are several structures and features which he does not mention. It seems proper, therefore, to offer here a more complete diagnosis.

Spermatia, hyaline, globose or ovate, 2.5–3 μ in diameter; borne in dark-colored spermodochidia grouped at rather regular intervals on two faces of the culm just below the inflorescence; oozing forth in mucilaginous drops through a longitudinal slit in the epidermis over each spermodochidium; produced endogenously from obclavate spermatiophores densely clustered at foci to form what are in fact numerous naked spermodochia in the spermodochidial cavities in the culms. The structure and development of these spermodochia is essentially like that illustrated for *S. longisclerotialis* (Whetzel **1929**: *fig. 23* [3]).

Sclerotia, cylindro-conical, ventricose below with rounded or bluntly attenuated base, gradually elongated above into a slender whiplike apex, variable in size, up to 20 cm. long by 1 cm. thick

[3] The legends for the plates in this article are incorrectly numbered. There is no text figure.

FIG. 2. Culms of *Carex aquatilis* var. *altior,* showing spermodochidia in fresh condition (October). Note the tendency to equal spacing along the culm and exposure of the spermatial masses by slits on two faces of the culm. Natural size. FIG. 3. A mature sclerotium (October) freed from the surrounding culm tissues and leaf bases except at very base and at tip. Normally at this time almost completely enclosed. Natural size. Many sclerotia smaller and more slender than this one.

FIGS. 2–3.

near the base, developed within the slender 3 angled culm, the base firmly nestled in the very base of the culm and the enclosing bases of the leaves, the lower half breaking forth through one face of the culm, the slender pointed tip firmly enclosed above in the culm, black without, sulcate, granulate, firm and white or pale pink within, structurally, the medulla consisting of densely interwoven, large, thick-walled hyphae, enclosed in a rind composed of smaller, densely packed, short hyphal-cells, the outer walls of which are impregnated with a black material.

Apothecia usually several to many (up to 20), fasciculate, arising from one point on the exposed surface to the sclerotium, long stipitate; the *cup* shaped like a thistle-funnel, finally becoming more or less urceolate to flat expanded, umbilicate, vinaceous brown to reddish brown, relatively thin (1 mm.), 4–22 mm. in diameter by 7–16 mm. deep, underside finely tomentose; *stipe,* variable in length (1.6–7.5 cm. long by 1–3 mm. thick) depending upon depth to which the sclerotia are immersed in the water or buried in the mosses, the cup and upper part of the stipe protruding; slender, flexuous, attenuated toward the point of attachment, upper part concolorous with the cup, base nearly black, coarsely tomentose; *asci,* cylindrical, narrowed below, obtuse or rounded above and somewhat thickened at the apex, pore faintly J +, 200–230 × 11 μ,[4] 8-spored, uniseriate; *ascospores,* ellipsoid, hyaline, smooth, without oil drops, 11–15 × 6.5–9 μ,[4] on germination in water often forming spermatiophores with spermatia at one or both ends; *paraphyses,* filiform, hyaline, branched near the base, scarcely enlarged at the tips, not exceeding the asci, 1–2 μ in diameter.

In *culture on potato dextrose agar* this species forms dense, white, cottony mats of aerial mycelium, reminiscent of those pro-

[4] These measurements are those given by Nyberg, presumably from living material. The following measurements by the junior author from his fresh material approximate those given by Nyberg: *asci* 192–213 × 11.8–13.5 μ; *ascospores* 13.5–16.9 × 8.5–10 μ. Measurements from dried specimens run appreciably smaller as might be expected.

FIG. 4. A part of the type specimen in *Carex inflata,* from Finland (dry). Sclerotium largely enclosed below. Collected June 19, 1931. (C.U. *28912*).
FIG. 5. A fascicle of young apothecia attached to a sclerotium, the base of which is broken off. From the original collection by Dr. C. L. Porter in the Medicine Bow Mt. swamp (C.U. *28910*), June 18, 1937. Specimen received in liquid preservative. Washed out and floated in water for photographing.
FIG. 6. Apothecia attached to sclerotium still partly enclosed in base of leaves of *Carex aquatilis.* Part of specimen collected near Lake Gärdsjön, Sweden, June 25, 1932, received in liquid preservative, washed out and floated in water for photographing (C.U. *21965*).

FIGS. 4–6.

duced by *S. sulcata* (Whetzel **1929**: *fig. 16*). No sclerotia are formed, however. In about 4 to 6 weeks black bodies of varying size appear in the hyphal mat. These consist of numerous closely packed spermodochia embedded in the mucilaginous mass of spermatia. The dark color of these spermodochia is due to a brown coloring matter in the spermatiophores, and in the spermatia, evident only in mass. These spermodochia produced in culture are in appearance and structure like those formed by *S. sulcata* and *S. longisclerotialis* on potato dextrose agar (Whetzel **1929**: *figs. 16 and 19*).

HABITAT:[5] In culms of *Carex aquatilis* Wahl. (*typica*), *C. aquatilis Wahl.* var. *altior* (Rydb.) Fern. and *C. inflata* Huds. (= *C. rostrata* Stokes = *C. ampullacea* Good) in wet sphagnum bogs of sub-arctic regions and in high mountain swamps of the north temperate zone.

DISTRIBUTION: In Europe, known only from the type locality in Finland, and from a collection made near Lake Gärdsjön in Sweden; in North America, from several collections from a swamp (alt. 9600 ft.) in the Medicine Bow Mountains in Wyoming.

TYPE SPECIMEN: Collected by W. Nyberg on *Carex inflata* Huds. (= *C. ampullacea* Good) in a sphagnum bog near Vessö, Borgå parish, Finland, June 19, 1931. Duplicates from this collection deposited in the Botanical Institute, Uppsala, Sweden and in Cornell Univ. Pl. Path. Herb. No. *28912*.

HERBARIUM MATERIAL: In addition to the type material the following collections have been studied:

From *Sweden:* On *Carex aquatilis* Wahl. (*typica*), Selet near Lake Gärdsjön, prov. Västerbotton, parish Lövanger, June 25, 1932. Coll. G. Lohammar (apothecia). Duplicate in Bot. Inst., Uppsala, Sweden and in C. U. Pl. Path. Herb. No. *21965*.

From *Wyoming:* In the Medicine Bow Mts. in a swamp (alt. 9600 ft.), below Nash Fork bridge near the Science Camp of the University of Wyoming, in Albany Co. Duplicates of most of the following collections are deposited in the "Rocky Mountain Herbarium" (R.M.H.) of the University of Wyoming, Laramie; in

[5] The names here used for the species of *Carex* have been determined by Dr. R. T. Clausen of Cornell, to be those now regarded as legitimate.

the private herbarium of W. G. Solheim (S); and in the herbarium of the department of Plant Pathology at Cornell University (C.U.):

On *Carex aquatilis* Wahl. var. *altior* (Rydb.) Fern.

(1) Coll. C. L. Porter, June 18, 1937 (apothecia), R.M.H. *188343* = S. *7319* = C.U. *28910*.

(2) Coll. W. G. Solheim and C. L. Porter, June 26, 1939 (apothecia), R.M.H. *182767* = S. *4738* = C.U. *31535*.

(3) Coll. W. G. Solheim, June 22, 1940 (apothecia), R.M.H. *188344* = S. *6796* and *6797* = C.U. *31536A*.

(4) Coll. W. G. Solheim, July 29, 1940 (early stages of infection), R.M.H. *188345* = S. *6807* = C.U. *31536B*.

(5) Coll. W. G. Solheim, Sept. 6, 1940 (young sclerotia), R.M.H. *188346* = S. *6757* = C.U. *31536C*.

(6) Coll. W. G. Solheim, Oct. 14, 1940 (spermodochidia and mature sclerotia), R.M.H. *188347* = S. *6806* = C.U. *29268*.

(7) Coll. W. G. and R. Solheim, June 27, 1942 (apothecia), R.M.H. *188342* = S. *7318* = C.U. *31537*.

On *Carex inflata* Huds. (= *C. ampullacea* Good).

(8) Coll. W. G. Solheim, Oct. 14, 1940 (sclerotia), S. *6808* = C.U. *31608*.

(9) Coll. W. G. and R. Solheim, June 27, 1942 (apothecia), C.U. *31539*.

Specimens of the June 26, 1939, collection have been distributed by Solheim under No. *204* in Mycoflora Saximontanensis Exsiccata. Duplicate specimens from certain of these Wyoming collections have been distributed to the following herbaria: Farlow Herb., Harvard Univ.; N. Y. Bot. Gard.; Mycol. and Pl. Dis. Survey, Bu. Pl. Ind., Washington, D. C.; Univ. Toronto, Canada; Univ. Museum, Ann Arbor, Mich.; Missouri Bot. Gard., St. Louis, Mo.; British Museum, London; and Royal Herb., Kew, England.

TAXONOMIC RELATIONSHIPS

That *S. Caricis-ampullaceae* is closely related to *S. longisclerotialis* as Nannfeldt's original query suggested is not to be denied.

The long, slender sclerotia remaining more or less anchored in the diseased culm, the spermodochidia grouped at intervals in the culm, and the peculiar thistle-funnel form of the apothecia all point unmistakably to this relationship. The similarity of the habitats and habits of the two is also significant in this connection. The apothecia of both arise from sclerotia typically submerged in water from which they must emerge to expand and expose the hymenium to the air for effective discharge and dissemination of their ascospores. The extraordinary size of the apothecia of *S. Caricis-ampullaceae,* and the peculiar cylindro-conical shape of its sclerotium are, however, alone sufficient to set it apart as distinct from its close relative, which moreover is not known to affect any of the species of *Carex* on which *S. Caricis-ampullaceae* occurs.

The only other species of *Sclerotinia* known to the writer which might be confused with *S. Caricis-ampullaceae,* is *Sclerotinia Vahliana* Rostrup, originally described from collections made in Greenland, but known to occur in several localities in Scandinavia and in Iceland. The apothecia of the two species are not strikingly different in appearance or structure, but the sclerotia of *S. Vahliana* are quite different in shape and size from those of *S. Caricis-ampullaceae.* They are compressed, curved, often approaching the form of a hollow sphere open at the ends and along one side. The two species occur on members of different genera, *S. Vahliana* being known only on species of *Eriophorum.*

DEPARTMENT OF PLANT PATHOLOGY,
CORNELL UNIVERSITY, ITHACA, NEW YORK
DEPARTMENT OF BOTANY,
UNIVERSITY OF WYOMING, LARAMIE, WYOMING

LITERATURE CITED

Nyberg, Wolmar. Några i Borgå och dess omnejd funna, sällsyntare svamp-arter. Memoranda Soc. pro Fauna et Flora Fennica. **10**: 20–23. Helsingforsiae. 1934.

Rostrup, E. *Sclerotinia Vahliana* n. sp. *In* Tillaeg til "Grönlands Svampe (1888)" Meddelelser om Grönland. **3**: 607. 1889. (Reprint dated 1891.)

Whetzel, H. H. North American species of Sclerotinia II—Two species on *Carex, S. Duriaeana* (Tul.) Rehm, and *S. longisclerotialis* n. sp. Mycologia **21**: 5–32. 1929.

THE DEVELOPMENT AND STRUCTURE OF LONGIA TEXENSIS

HORACE L. BARNETT

(WITH 3 FIGURES)

Until recently *Longia texensis* (Berk. & Curt.) Zeller, was included in the genus *Gyrophragmium*. Zeller [1] has discussed the nomenclature regarding this species and has described the new genus *Longia*.

The taxonomic position of the genus *Gyrophragmium* among the Gasteromycetes has been questioned by some mycologists. Fischer (**6**), while placing it in the Gasteromycetes, regards it as close to *Montagnites*, which he places in the Agaricaceae. Conard (**5**) states that "*Gyrophragmium* may prove to be near *Secotium*," which he believes to be near *Agaricus*. Lloyd (**7**) says that *Gyrophragmium* "has no place in the Gasteromycetes. Its relations are more close to the Agarics. It is the connecting link between the two passing on one hand through *Montagnites* to *Coprinus* and on the other through *Secotium* to the true Gasteromycetes." Morse (**8**) believes that *Gyrophragmium* and *Endoptychum* form a transition between the Gasteromycetes and the Hymenomycetes.

Because of the uncertain taxonomic position of the genus and because of the local abundance of material the writer became interested in the present developmental study of *Longia texensis*. It was hoped that the study would throw some light on its true relationship to certain other genera, especially *Secotium*, *Endoptychum*, *Podaxis*, *Montagnites*, *Coprinus*, and *Agaricus*.

THE MATURE FRUIT BODY

An abundance of fruit bodies in all stages of development was found on or near the campus at State College, New Mexico. Considerable variation was found in the size of the plants and the scaliness of the peridium. These variations were thought to be

[1] In the current issue of *Mycologia*.

due primarily to the moisture conditions during growth. The fruit bodies were found only in sandy soil. Some appeared in bare soil devoid of any cover, while others grew in areas sparsely covered with grass. The color of the fresh specimens is pure white at first, usually turning pale tan at full maturity. Dried plants are light gray or tan, often with some yellow. Fresh plants may turn yellow where injured or bruised.

Considerable variation was also found in the method of dehiscence of the peridium. Most of the specimens remain closed until maturity (FIG. 1, *A*). Upon desiccation, or soon afterward, short longitudinal slits usually appear near the lower edge of the peridium where it joins the stipe. Sometimes the slits occur higher up and sometimes only irregular breaks occur in the fragile peridium. Less commonly the peridium splits open in a circular manner, leaving an annulus on the stipe (FIG. 1, *B*). Some variations in the mature plants are also shown by Lloyd's photographs in his Mycological Notes, plate 23, figs. 1, 2, and 3 (as *Gyrophragmium decipiens*), and plate 24, fig. 5 (as *G. texense*).

At maturity the gleba becomes desiccated and remains intact. Apparently no autodigestion occurs. The spores are abundant and sift out of the peridium at the slightest jar. At maturity the spores are almost black with a slight tinge of purple.

THE DEVELOPMENT OF THE FRUIT BODY

One small area which was under frequent irrigation and where fruit bodies had appeared the previous season was observed during 1941. The first fruit bodies appeared above ground in early May. During the next three months five successive crops of fruit bodies appeared. Each time they were removed before reaching maturity. After that time no accurate observations were made. However, another crop appeared in October.

The fruit bodies make their appearance above the surface of the ground 2 or 3 days after a rain or an irrigation. It requires about 5 to 8 days to reach maturity. The rhizomorphs are slender, white and very fragile. They grow in a horizontal position 1 or 2 inches below the surface of the soil. The fruit bodies arise as enlarged tips of the upright branches of the rhizomorphs (FIG. 3, *A*). Numerous small, almost-spherical fruit bodies can be found

just beneath the surface of the soil. Apparently a few fruit bodies develop at the expense of the others. Not until the fruit bodies reach a diameter of about 4 to 6 mm. do the stipe and peridium regions become distinguishable. The peridium region first appears

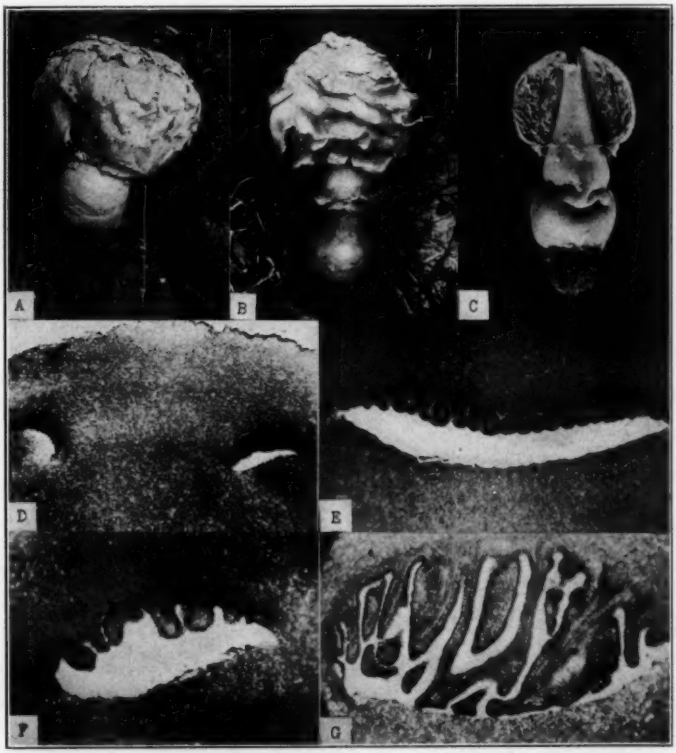


FIG. 1. *A*, Dried mature fruit body showing the typical upward peeling of the partial veil, × ⅔. *B*, Fresh mature fruit body showing an annulus, × ½. *C*, Immature fruit body cut open to show the character of the gleba and the partial veil. Photograph made from a preserved specimen, × ⅔. *D*, median longitudinal section of a young fruit body 4 mm. in diameter, × 30. *E*, Tangential section of a fruit body 6 mm. in diameter, × 40. *F*, Median longitudinal section of a fruit body 6 mm. in diameter showing the young tramal plates and the centrifugal extension of the palisade layer, × 40. *G*, Median longitudinal section of a fruit body 11 mm. in diameter, × 40. The columella is at the right.

as a small swelling at the apex of the much larger stipe region. The fruit bodies push through the soil when they are about 2 cm. tall. As growth progresses the stipe elongates and the peridium becomes more rounded and increases in size until maturity. At about the time the peridium reaches 1 cm. or slightly more in diameter the tissue at the base of the peridium (the partial veil) begins to pull away from the stipe. Scales begin to appear on the surface of the peridium of some specimens at about this time. The younger stages are illustrated in figure 3, *A*.

The material sectioned during the present study was fixed in formal-acetic-alcohol and stained in Heidenhain's iron-alum haematoxylin with orange G as a counter stain. A longitudinal section of a very young fruit body (3 mm. in height) before the glebal cavity is formed shows that the structure is entirely uniform throughout, except for being slightly more compact near the upper part, which later is to become the peridium. No universal veil is present.

The annular glebal cavity first appears when the fruit body is about 3 or 4 mm. in diameter. It is formed by the separation of the tissue in a small area near the columella region and develops centrifugally. It soon appears as a narrow ring elongated in a radial direction (FIG. 1, *D*). The palisade layer begins to form before the glebal cavity appears. In the youngest material showing a cavity the palisade is present as a distinct layer lining the upper surface (FIG. 1, *D*). The contents of the hyphae of this layer are more deeply stained than those of the surrounding tissue. The tramal plates appear first as irregular downward projections from the palisade (FIGS. 1, *E, F, G*). The formation of these plates begins at or near the columella and progresses outward. In a median longitudinal section the older plates can be seen near the stipe region and younger ones toward the periphery (FIG. 1, *F*). The plates then extend downward to the base of the glebal cavity (FIG. 1, *G*).

A cross section of a young fruit body (9 mm. in diameter) near the top of the glebal cavity shows that the tramal plates run generally in a radial direction (FIG. 2, *A*). Some of the plates extend completely across the cavity. There appears to be some anastomosing of the tramal plates in the earlier development but little or

none in later stages. Lower down in the glebal cavity (FIG. 2, *B*) the plates appear to be shorter and more irregular, due to the frequent branching and continued downward growth in local areas rather than throughout their entire length. Meanwhile new tramal plates are being formed near the edge of the glebal cavity (FIG. 2, *B*). The new palisade extends centrifugally into the sterile tissue at the edge (FIGS. 1, *F*; 2, *C*) and is followed by the splitting of this tissue. The columella elongates and the glebal cavity becomes

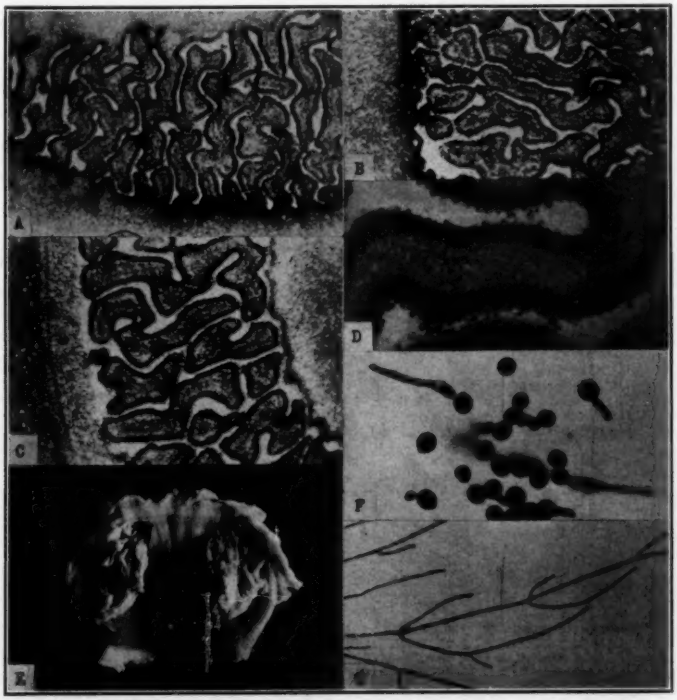


FIG. 2. *A*, Cross section of a fruit body 9 mm. in diameter near the top of the glebal cavity, × 40. *B*, Same as *A* lower down in the glebal cavity, × 40. *C*, Same as *A* near the base of the glebal cavity, × 40. *D*, Cross section through the gleba showing the structure of a tramal plate, × 250. *E*, Section through an immature fruit body showing the folded nature of the tramal plates, × 2. *F*, Spores germinating on a film of agar, × 750. *G*, Mycelium from a multisporous culture growing on agar, × 125.

more rounded and finally somewhat elongated in a longitudinal direction. Also during this time the tramal plates are growing downward, branching and folding in all directions, filling the entire cavity.

The tramal plates are entirely free from the columella, except at its very apex (FIG. 3, *C*). They are also free at the base of the cavity, being attached at the top and side of the peridium. The smooth hymenium extends downward on the curved surface of the peridium for some distance beyond the point where the last-formed plates are attached. Some tissue at the base of the peridium near the columella remains sterile.

In a median cross section of a half-mature fruit body (peridium 2 cm. in diameter) none of the plates were found to extend from one side of the glebal cavity to the other (FIG. 3, *D*). There appears to be two overlapping series of branched and folded plates. The one nearest the columella is thought to represent the first-formed plates, which extend outward and downward from the top of the cavity to or nearly to the base (FIGS. 2, *E*; 3, *C*). The plates of the second series are attached to the curving surface of the peridium and extend inward and downward. In thin sections the plates appear to form small cavities, particularly near the peridium wall (FIGS. 3, *C, D*). These appear to have been formed by the partial anastomosing of the tramal plates in the early stages of development, or represent sections through folds in the plates. There is no evidence that these small cavities are completely enclosed.

The dissection of an immature fruit body shows more clearly the way in which the tramal plates are folded and crowded into the glebal cavity (FIG. 2, *E*). The folding is more pronounced near the base. The gleba is at first white, then changes through gray and purple brown to almost black when the spores are mature.

The partial veil first becomes distinguishable when the fruit body is about 8 to 10 mm. in diameter. Only a faint line outlining the partial veil can be seen at this time in a microscopic view of a longitudinal section (FIG. 3, *C*). The structure of the partial veil seems to be very similar to that found in *Agaricus Rodmani* (1) and some varieties of *Agaricus campestris* (2). The lower limb of the double veil first becomes apparent in external view when it

separates slightly from the stipe as the latter elongates. At this stage the veil is attached to the stipe by a rather broad band of tissue which is continuous above with the outer layer of the columella (FIGS. 1, *C;* 3, *C*). This latter feature is also shown to a certain extent in *Agaricus arvensis* and *A. comtulus* (**3**). Toward maturity the columella elongates rapidly, creating an upward tension on the tissue of the veil. In most specimens the attachment of the broad portion of the veil to the stipe is apparently weaker than is the veil tissue at the edge of the peridium. The tension, therefore, causes a separation of the veil from the stipe. The lower limb of the veil is then pulled outward and upward and the outer layer of columella tissue, being continuous with the veil, is in turn pulled upward (FIG. 1, *A*). This seems to be a more extreme case of the peeling which Atkinson (**2**) describes and illustrates for *Agaricus campestris* var. *columbia.* In *Longia texensis* the veil may be pulled entirely free from the stipe, leaving a circular opening around the stipe. The extremely dry atmosphere causes the fruit bodies to dry out immediately after maturity and the veil and peridium become very fragile.

Several specimens have been found which show a definite annulus on the stipe (FIG. 1, *B*). This annulus is very similar to that found on *Agaricus,* except that it is not so fleshy. It is thought that in those specimens which form an annulus the tissue connecting the partial veil to the stipe is much stronger than in those not forming an annulus. Thus, as the columella elongates, the tension tears the partial veil at the edge of the peridium, leaving most of it attached to the stipe as the annulus.

The hymenium is composed of densely packed basidia (FIG. 2, *D*) which arise as enlarged tips of the hyphal branches. No clamp connections were seen on any hyphae of the fruit body. No cystidia are present. Most of the basidia produce 4 spores, but some 2-spored basidia were seen (FIG. 3, *B*). The basidia elongate considerably just before the spores are mature. The nuclear behavior, as far as it could be traced, follows the usual pattern of the basidiomycetes. Four nuclei were seen in basidia producing 4 spores and likewise in those producing but 2 spores. The spores are borne on slender sterigmata and are not shot off from the basidia. All stages in the maturation of the spores can be seen

in a section of a half-mature fruit body. Most of the spores having clearly visible nuclei were uninucleate, but a few binucleate spores were seen. It is thought that only one nucleus enters each spore and may later divide before germination. Soon after the

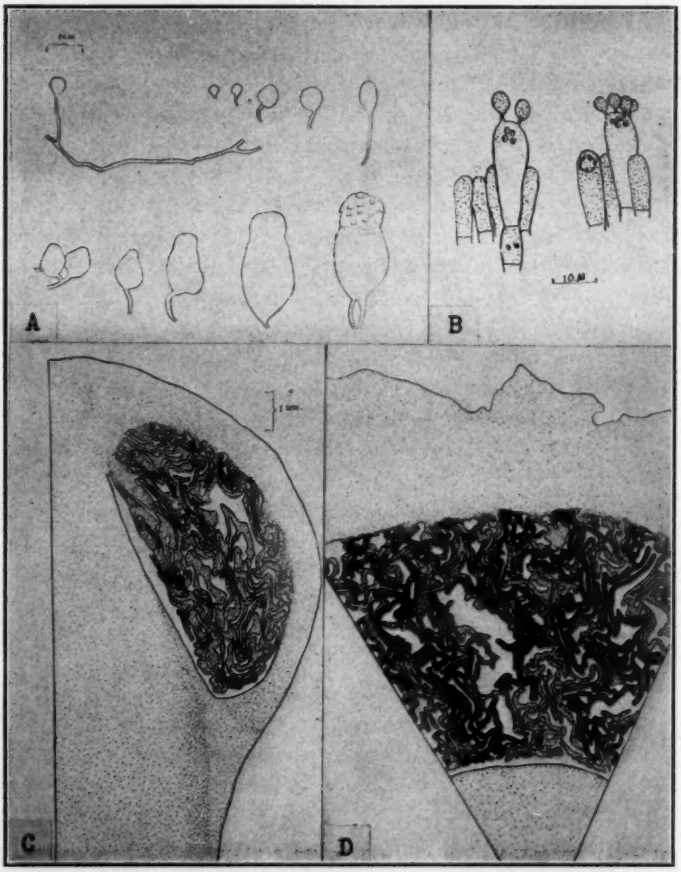


FIG. 3. *A*, Drawing of rhizomorph and very young fruit bodies. *B*, Basidia. *C*, Camera lucida drawing of a median longitudinal section showing the branched and folded nature of the tramal plates. *D*, Camera lucida drawing of a median cross section of an immature fruit body 2 cm. in diameter. Some of the plates are blackened so that they may be more easily traced.

spore reaches maturity the wall darkens and it is then impossible to see the nuclei. The spores are almost spherical and are 4.5–7 μ in diameter.

The spores germinate readily an agar (FIG. 2, *F*). Spores from fresh fruit bodies germinated only slightly better than those from dry fruit bodies several months old. It was estimated that only about 10 per cent germination was obtained. The mycelium resulting from the germination of many spores is pure white. Its growth is comparatively slow. Slender white rhizomorphic strands appear in older cultures.

Several single germinated spores were isolated and grown on agar. The mycelia which resulted from these were from all appearances like those developed from multispore cultures. Both types of mycelia were grown on agar slides and stained with Heidenhain's haemotoxylin. The multisporous mucelia showed from 2 to several nuclei per cell, the number usually being even. As many as 12 nuclei were seen in a few cells. No clamp connections were present. The cells of the monosporous mycelium contained from 1 to 8 nuclei each, the number being either odd or even. A rather unusual opposite type of branching (FIG. 2, *G*) was observed on the mycelia, one of the branches being formed before the other. Anastomoses of the hyphae were frequent.

CONCLUSIONS AND SUMMARY

1. The early development of the fruit body of *Longia*, especially of the annular glebal cavity and the palisade layer and the early formation of the tramal plates, agrees closely with that of some members of the Agaricaceae, particularly *Agaricus*. The additional fact that the partial veil of *Longia* is very similar in structure to that found in *Agaricus* tends to strengthen the belief that the two genera are closely related.

2. The older fruit bodies of *Longia* resemble more closely certain of the Gasteromycetes. The plants dry out and become fragile, and the peridium typically remains closed, or nearly so, for some time after the spores are mature. The spores are not shot off from the basidia but remain on the tramal plates and sift out after the peridium breaks open.

3. The presence of densely crowded, branched and folded tramal plates which often anastomose and form partially enclosed cavities is similar to that found in *Endoptychum* (*Secotium*) *agaricoides* by Conard (**5**) and in *Podaxis pistillaris* by Brasfield (**4**).

4. *Longia* shows a closer relationship to the Agaricaceae than does *Secotium, Endoptychum* or *Podaxis.*

5. On the basis of the present study it seems that the genus *Longia* would logically fall in the Secotiaceae (if that family is recognized) of the Hymenogastrales.

6. The developmental studies of other genera, especially of *Montagnites,* may prove helpful in determining the true taxonomic position of the members of this group of fungi.

The author wishes to express his appreciation to Dr. S. M. Zeller for the loan of some reprints and for his helpful and stimulating letters.

NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS,
STATE COLLEGE, NEW MEXICO

LITERATURE CITED

1. **Atkinson, George F.** Morphology and development of *Agaricus Rodmani.* Proc. Am. Phil. Soc. **54**: 309–341. 1915.
2. ——. The development of *Agaricus campestris.* Bot. Gaz. **42**: 241–246. 1907.
3. ——. The development of *Agaricus arvensis* and *A. comtulus.* Am. Jour. Bot. **1**: 3–22. 1914.
4. **Brasfield, Travis W.** The morphology of *Podaxis pistillaris.* Univ. Iowa Stud. Nat. Hist. **17**: 199–211. 1937.
5. **Conrad, H. S.** The structure and development of *Secotium agaricoides.* Mycologia **7**: 94–104. 1915.
6. **Fischer, Ed.** Hymenogastrineae in E. & P. Nat.-Pfl. I. **1**: 296–313. 1900.
7. **Lloyd, C. G.** Mycological Notes **1**: 195–197. 1904.
8. **Morse, E. E.** A study of the genus *Podaxis.* Mycologia **25**: 1–33. 1933.

NORTH AMERICAN SPECIES OF GALEROPSIS, GYROPHRAGMIUM, LONGIA, AND MONTAGNEA [1]

S. M. ZELLER

(WITH 1 FIGURE)

The four genera, *Galeropsis, Gyrophragmium, Longia,* and *Montagnea,* along with *Secotium,* form a natural group in the Secotiaceae, which is one of the gasteromycetous families recognized as closely related to the Hymenomycetes.

The fructifications are stalked and more or less pileate, except in *Montagnea* where the pileous tissues are actually wanting. The gleba is mostly lamelloid but sometimes anastomosing until a more or less spongy, chambered condition results. In this group the gleba does not become a powdery spore mass at maturity, as in the Podaxaceae, nor does it rapidly decompose or deliquesce, as in certain closely related genera of the Agaricaceae. The stem is extended above as a percurrent columella. The spores are dark-colored in contrast to the echinulate or verrucose, hyaline or subhyaline ones in the *Elasmomyces-Macowanites* group.

The chief purpose of the present paper is to discuss these genera in relation to the species occurring in North America.

The writer acknowledges with appreciation the privilege of studying specimens made available by the herbaria of the University of California, Harvard University (Farlow), University of Michigan, and New York Botanical Garden, as well as the special aid rendered by Dr. W. H. Long and Dr. D. P. Rogers.

GALEROPSIS Velenovsky, Mykologia **7**: 105. 1930.

Syn. *Psammomyces* Lebedeva. Trudy po Zaschtsch. Rastjenij. **V**. 1932.

The following is an emended description.

[1] Published as Technical Paper No. 423 with the approval of the Director of the Oregon State Agricultural Experiment Station, Corvallis. Contribution from the Department of Botany.

Pileus cylindrical to conic, slender, acute above, dry, usually glabrous, drying tenacious, persisting, margin nude or with remains of cortina, stipe slender, tenacious, solid or hollow, mostly glabrous; gleba lamelloid, narrow, free, at first pale, then ochraceous; spores ovoid or ellipsoid, ochraceous, smooth, borne acrogenously.

This genus has affinities with the *Bolbitius-Galera* group of agaricaceous genera. Velenovsky considered it nearest to *Galera* through *G. hapala* Fries, while Singer [2] considers *Galeropsis* closely allied to his Bolbitioideae.

The type species is *G. desertorum* Velen. & Dvorak. (Mykologia **7**: 106. 1930) from Moravia. Other species previously assigned to the genus are *G. plantaginiformis* (Lebedeva) Singer (Syn. *Psammomyces plantaginiformis* Lebedeva), and *Galeropsis cucullata* (Shope & Seaver) Singer.[3]

There are two known species in North America as follows:

1. *Galeropsis cucullata* (Shope & Seaver) Singer.

   Syn. *Bolbitius cucullata* Shope and Seaver, Mycologia **27**: 649–650. *illus.* 1935.

   Secotium longipes Zeller, Mycologia **33**: 209–210. *illus.* 1941.

For a complete description of *G. cucullatus* reference may be made to either of the two citations above. Singer points out the similarity of this species with *G. plantiginiformis,* which has been reported from Turkestan and the Caucasian regions of Asia and Europe. This similarity is more apparent in the general stature and shape of the fructifications of the two species (See illustration of *G. cucullatus* in Mycologia **27**: 648. 1935) than in their microscopic characters. Young specimens of *G. cucullatus* have pileus with fibrils from the margin, and the basidia are gasteromycetous.

The other North American species is:

Galeropsis polytrichoides comb. nov.

Syn. *Secotium polytrichoides* Zeller, Mycologia **33**: 211–212. *illus.* 1941.

G. polytrichoides has closer affinities with *G. desertorum* than *G. cucullatus* although it is definitely cortinate as the latter. The

[2] Singer, R. Studien zur Systematik der Basidiomyceten I. Beih. Bot. Centralbl. **56 Ab. B**: 147–150. 1936. (See p. 149.)

[3] Loc. cit., pp. 148 and 150.

spores of the type species are twice as long as those of this species, as may also be said of the pileus in proportion to its width.

GYROPHRAGMIUM Montagne, Ann. Sci. Nat. II. **20**: 77. 1843.

Syn. *Polyplocium* Berkeley, London Jour. Bot. **2**: 202. 1843.

Fructifications epigeous, stalked; stem percurrent as a columella and continued above as an expanded, cap-like pileus; peridium at first turbinate, then rupturing around the circumference, leaving the lower half as a funnel-shaped volva at the base of the stem and sometimes partially sheathing the latter and the upper part covering the pileus; annulus usually present; gleba suspended from the under surface of the pileus-like expansion of the stem, composed of radial, ventricose, crowded, wavy, sometimes anastomosing lamella, free, at first tough, flexible, at maturity fuscous or black; spores spherical or subsperical, smooth, brownish.

The type species is *Gyrophragmium Delilei* Montagne (1843). Montagne based the genus on *Montagnites Dunalii* Fries (1836) and according to the present International Rules of Botanical Nomenclature undoubtedly the combination for the type species should be **Gyrophragmium Dunalii** (Fries) but doubtless *G. Delilei* Montagne should be conserved.

As indicated above *Polyplocium* is reduced to synonymy with *Gyrophragmium* following the able discussion of this point by Lloyd.[4] From these notes and Lloyd's illustrations as well as the fragmentary specimens studied from South Africa and North Africa, *G. Delilei* and *G. inquinans* (Berk.) Lloyd are doubtless congeneric but because of spore color, shape, and color of fructifications, the two species can hardly be construed as identical.

A study of the morphological development of the early stages of the fructifications of a species in this genus is much to be desired. It would appear from remnants of fundamental tissues in mature stages that the peridium is double. The outer layer partially or entirely remains at the base of the stem as a volva which is free or more or less sheathing. Sometimes a portion remains as a partial coating on the upper surface of the pileus, which has rather indefinite origin. The origin of the annulus, which appears to be

[4] Lloyd, C. G. *Gyrophragmium* and *Polyplocium*. Mycological Writings **Vol. 1,** Brochure 18 No. **291**: 195–196. 1904.

double in *G. californicum,* is of considerable conjecture. Is it composed of an upper layer (partial veil) extending from the margin of the pileus to the stem and a lower layer which was the extension of the inner peridial layer above the pileus or does its lower portion sheath the stem as an innate superficial layer? A study of the developmental morphology should throw light on such questions and indicate relationships between *Gyrophragmium* and *Longia* and *Montagnea.*

Two species have been named from North America, i.e. *Polyplocium californicum* Harkness and *Gyrophragmium texense* (Berk. & Curt.) Massee. *P. californicum* Harkness therefore becomes

1. **Gyrophragmium californicum** (Harkness) Morse comb. nov. in Herb. Univ. Calif.

   Syn. *Polyplocium californicum* Harkness, Calif. Acad. Sci. Bull. **1**: 159, 1885.

   Polyplocium Curranii Harkness in Herb. N. Y. Bot. Gard.

The following is an emended description of *G. californicum.*

Fructifications tall, slender with a pileus formed from the discoid expansion at the apex of the stem; pileus expanding to flat or depressed, 2–4 cm. broad, covered by remains of the universal veil or peridium, grayish, drying, yellowish to buff or straw-colored; stem 1–1.5 cm. in diam., elongating to 10–20 cm., concolorous; volva at base of stem, white, free, 1–1.5 cm. broad, remains of the ruptured universal veil or outer peridium; annulus sometimes evanescent, sometimes persisting, ample, double, papery above, heavy below, white drying straw-colored; gleba rusty-black, lamelloid, free, suspended from the lower surface of the pileus; spores dark reddish brown smooth, subglobose to irregular, angular to ellipsoid, 6–8.75 × 4–5 μ.

Sandy locations in central California. January to June.

As Lloyd [5] has suggested it is unfortunate that Dr. Harkness did not use the greatest care in distributing his specimens. The specimen at the Berlin Imperial Museum is *Montagnea arenarius* and Hollos [6] cites it as a specimen from Harkness himself and that it

[5] Loc. cit.

[6] Hollos, Ladislaus. Die Gasteromyceten Ungarns. Leipzig, 1904. (See pp. 30–32 and *T. 1–2.*)

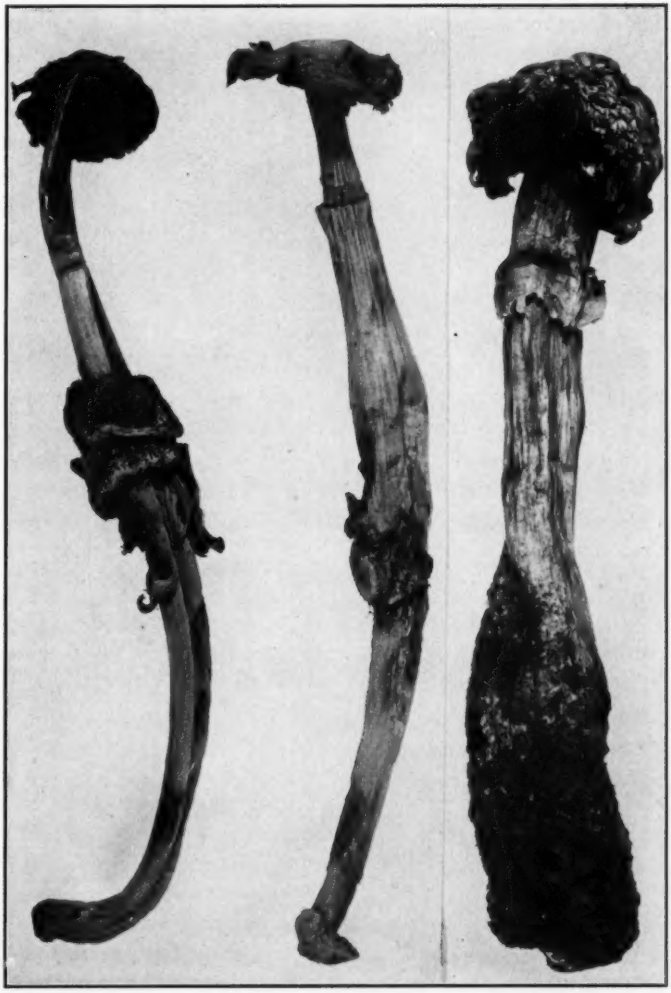


FIG. 1. Left, *Gyrophragmium californicum* (Harkness) Morse (from dried specimens in Univ. Calif. Herb.). Right, the type specimen of *Longia texensis* (Berk. & Curt.) Zeller var. *major* Zeller, × ½ nat. size.

agrees completely with *Montagnites radiosus* (Pall.) Hollos. As cited below the specimens at the New York Botanical Garden and the University of California fit the Harkness description of *G. californicum*.

This species is very limited in its distribution, having been reported only from the area near San Francisco Bay (FIG. 1).

Specimens examined: California: *H. W. Harkness*, Jan., 1882 (in N. Y. Bot. Gard. Herb. under the name *Polyplocium Curranii* Harkn.); San Mateo County, San Francisco, *H. W. Harkness*, May (in N. Y. Bot. Gard. Herb.), Presidio, *Cleone Wetherbee*, April 6, 1929 (in Univ. Calif. Herb. under the name *Gyrophragmium californicum* (Harkn.) Morse).

Gyrophragmium texense (Berk. & Curt.) Mass. is considered not to be congeneric with *Gyrophragmium* as created above and therefore has been transferred to the following new genus.

Longia gen. nov.

Fructifications agaricoid with stem and capitate peridium; peridium subglobose or depressed globose to broadly convex; surface smooth or rupturing into scales; partial veil leaving a more or less permanent annulus; stem percurrent as a columella, more or less widening above to underlie the upper peridium; gleba black at maturity, lamelliform and variously anastomosing; hymenium of paraphyses and basidia; spores black, subglobose to ellipsoid.

Type species, *Secotium texense*.

The writer is dedicating this new genus to Dr. W. H. Long who has contributed materially to our knowledge of gasteromycetes in the semiarid sections of the southwestern United States.

1. **Longia texensis** (Berk. & Curt.) comb. nov.
   Synonyms:
   Secotium texense Berk. & Curt. Grevillea **2**: 34–35. 1873.
   Polyplocium columnare Ellis & Galloway. 1889. in Herb. N. Y. Bot. Gard.
   Gyrophragmium texense (Berk. & Curt.) Massee, Grevillea **19**: 96. 1891.
   Polyplocium striatum Ellis & Ev. 1893. in Herb. N. Y. Bot. Gard.

Secotium decipiens Peck, Bull. Torrey Club **22**: 492. 1895.
Gyrophragmium decipiens (Peck) Lloyd, Myc. Writ. **1**: 62. 1901.
Podaxon strobilaceous Copeland, Ann. Myc. **2**: 4. 1904.

Fructifications agaricoid in form with stem and capitate peridium, 5–12 cm. tall; peridium subglobose or depressed globose to broadly convex, 3–9 cm. broad, 2–7 cm. deep, at first closed below by a "partial veil," rather closely appressed to the stem below, lower part sometimes splitting longitudinally but usually forming a double annulus, the upper part left in the form of a pileus; surface smooth or rupturing into loose or appressed scales, cream- or buff-colored becoming darker (dark warm brown) and sordid grayish at maturity; stem stout, 2–3.5 cm. in diam. below usually tapering upward, abruptly narrowed above into a percurrent columella widening above to underlie the upper pileate peridium, firm becoming woody on drying, solid, internally yellowish or pinkish, externally smooth, usually becoming striate, colored like the peridium; gleba lamelliform to variously united and anastomosing forming irregular cavities, free from the stem, 1–2 cm. deep, ventricose, becoming bone brown to black; hymenium smooth, blackish; basidia broadly clavate, tetrasporous; sterigmata slender, long; spores subglobose to slightly obovoid, sterigmatal scar prominent, smooth, dark brown, 5–6.3 × 6.2–7.5 μ.

Usually in semiarid, waste places. February to November. Central Texas, westward to San Diego county, California and north to Josephine county, Oregon.

The distinctions between *Gyrophragmium* and *Longia* are very well paralleled by those between *Amanita* and *Lepiota* in the Agaricaceae. *Longia* lacks the persistent universal veil or volva, but is annulate. The gleba or gills are free in all four genera mentioned. *Longia* perhaps provides closer affinities with the smooth-spored members of the Agaricaceae than any other gasteromycete. Barnett [7] who has had opportunity to study all stages of development of the fructifications of *Longia* has shown the close parallelism to the development of certain species of *Agaricus*. Barnett has included good illustrations of *L. texensis*.

[7] Barnett, H. L. The development and structure of *Longia texensis* (in a current issue of MYCOLOGIA).

Specimens examined:

Texas: In mesquite flats, no locality given, *W. H. Long, Jr.* No. 3, 1901 (in N. Y. Bot. Gard. Herb.). Eastland county, Cisco, *E. A. Smith,* May–June, 1935 (in Zeller Herb.), June 5–10, 1935 (in U. Mich. Herb.), Eastland, *E. A. Smith,* April 8, 12, 20, 23 (2 coll.), 1934, May 6 (2 coll.), 1934; Hudson county, *E. Clover,* No. 806, May 3, 1933 (all in U. Mich. Herb.); La Salle county, 105 mi. S.W. of San Antonio (in Farlow Herb.); Travis county, Austin, *F. McAllister* (in N. Y. Bot. Gard. Herb), *A. M. Ferguson,* 1902 (in Patouillard Herb. at Farlow Herb., ex. W. H. Long Herb. No. 1825).

New Mexico: Dona Ana county, Las Cruces, *E. O. Wooton,* Feb. 22, 1893 (type of *Polyplocium striatum* E. & E. herb. nom.), Oct., 1893, *F. Garcia,* Apr., 1894 (No. 102, J. B. Ellis) (All in N. Y. Bot. Gard. Herb.), *H. L. Barnett,* during the year, 1941 (in Zeller Herb.).

Oregon: Josephine county, Wilderville, *S. M. Zeller,* July 28, 1941.

California: Central California, *H. W. Harkness,* Apr. to Aug. (Ellis Herb. in N. Y. Bot. Gard. Herb.); Butte county, Chico, *L. C. C. Krieger,* Autumn, 1912 (in N. Y. Bot. Gard. Herb.); Contra Costa county, Mt. Diablo near Antioch, *H. M. Hall,* Oct. 12, 1918 (in U. Calif. Herb.); Fresno county, near Auberry, *W. T. Shaw,* April 18, 1936 (in U. Calif. Herb.); Glenn county, Orlando, *Mrs. Bruno Koehler,* Nov., 1924 (in U. Calif. Herb.); Los Angeles county, Claremont, *C. F. Baker,* June, 1914 (in N. Y. Bot. Gard. Herb.), Lamanada Park, *E. A. Bonine,* May, 1897 (in N. Y. Bot. Gard. Herb.), Palmdale, *Ann Frey,* May 5, 1940 (in U. Calif. Herb.), Pasadena, *L. N. Gardner,* April, 1908 (in U. Calif. Herb.), *A. J. McClutchie,* Nov., 1894 (comm. by A. P. Morgan to N. Y. Bot. Gard. Herb., Dec., 1894); Orange county, Santa Ana, *Miss Geis,* Apr., 1902 (in N. Y. Bot. Gard. Herb.), Plumas county, Quincy, *D. L. Burdick,* July, 1933 (in U. Calif. Herb.), Riverside county, Riverside, *C. O. Smith,* Jan. 15, 1935 (in U. Calif. Herb.); San Benito county, Pinnacles National Monument, *Nick McKibben,* May 7, 1939 (in U. Calif. Herb.); San Bernardino county, Mentone, *W. I. Teuch,* May 9, 1900 (in U. Calif. Herb.), Rattlesnake Canyon, *Mrs. C. P. Krauth,* Feb.,

1934 (in U. Calif. Herb.); San Diego county, Imperial Beach, *Dr. E. A. Purer,* Mar. 26, 1938 (in U. Calif. Herb.), San Diego, *C. B. Orcutt,* March, 1889 (type of *Polyplocium columnare* Ell. & Galw. herb. nom. in N. Y. Bot. Gard. Herb.); Solano county, Davis, *F. H. Bolster,* Jan., 1912 (in U. Calif. Herb.); Stanislaus county, Blakesley Beach, Empire, *E. E. Morse,* June, 1939 (in U. Calif. Herb.).

Longia texensis var. **major** var. nov.

Fructifications large, 15–30 cm. tall, tan to grayish; stems bulbose, 5–7 cm. in diam. at the base when fresh, drying 3–4.5 cm. below and 2.5–3.5 cm. above, smooth, sometimes scaly, wrinkled but not striate when dry, sometimes with reddish brown streaks, solid; annulus usually persistent, normally superior; peridium subglobose to expanded 6–12 cm. broad, 3–6 cm. deep, quite smooth to areolate when young, with large scales at maturity; gleba and spores as in species.

In semiarid locations. April to September. Distribution: From Yolo county, California, south into northern Mexico.

This is the large Pacific Coast plant to which Lloyd referred under *Gyrophragmium decipiens* as "much more obese . . . with a thick stem" (Myc. Writ. **1**: 196. 1904) and beautifully illustrated in his pl. 23, fig. 1.

This is in contrast to *Longia texensis* itself which he illustrated in pl. 23, figs. 2 and 3 and in pl. 24, fig. 5. When the latter grows in the margins of cultivated, and especially irrigated, areas it attains larger size than in its usual arid or semiarid habitat, but variety *major* is distinctly larger even under semiarid conditions. The cap is more conspicuously scaly at maturity than the species (FIG. 2).

Specimens examined:

Mexico: Baja California, Zaragora, *C. B. Orcutt,* April, 1889 (in Zeller Herb., comm. by C. G. Lloyd).

California: *A. J. McClatchie,* no further data (in N. Y. Bot. Gard. Herb.); Kern county, Wasco, *Mrs. Emma S. Keese,* April 29, 1932 (in U. Calif. Herb.); Los Angeles county, near Lancaster, *Richard Greer,* April 24, 1940 (in U. Calif. Herb.); Solano county, Davis, *F. H. Bolster,* June and Sept., 1912 (U. Calif. Herb.); Yolo county, Woodland, *Eugene Brauner,* April 21, 1940, *type* (in U. Calif. Herb.).

MONTAGNEA Fries, Genera Hymenomycetum p. 7. (April) 1836; *not Montagnaea* DC.

Syn.

Montagnea Fries, in litt. 1833.

Montagnites Fries, Epicrisis p. 240. 1836.

Fructifications, stipitate, with general *Coprinus*-like appearance; peridium remaining as a volva at the base of the stipe; stem expanded at apex into a flattish disk, from the margin of which fall radially the free (not anastomosing), nude, persistent (not deliquescent), lamelloid gleba; spores smooth, dark fuscous, black *en masse*, borne acrogenously.

Fries first published *Montagnea* in his "Genera Hymenomycetum," April, 1936, and later changed the name to *Montagnites* in the Epicrisis to make way for DeCandolle's *Montagnaea* which was a renaming of a genus, *Montañoa*, in the Compositae. *Montagnaea* was not published until October, 1936, and at any rate is regarded as invalid by the phanerogamic taxonomists (see Kew Index). These circumstances give the name *Montagnea* Fries clear standing, both on the basis of different spelling and from priority, against *Montagnaea* DC. *Montagnea* is a more desirable name for, according to the nomenclatorial system now generally recognized, *Montagnites* could more appropriately represent a fossil genus. Montagne [8] emended Fries' description of *Montagnea* and indicated there was no legitimate reason for the name *Montagnites*.

The type species is *M. arenarius* (DC.) since *Montagnites Dunalii*, listed first by Fries, belongs in Montagne's genus, *Gyrophragmium*.

1. **Montagnea arenarius** (DC.) comb. nov.

Syn. *Agaricus* (*Boletus*) *radiosus* Pallas. Russ. Reis 2. p. 744. 1777.

Agaricus arenarius DC. Flore Francaise **6**: 45. 1815.

Montagnites Candollei Fries, Epicrisis p. 241. 1836.

Montagnites Pallasii Fries, Epicrisis p. 241. 1836.

Fructifications 8–30 cm. tall, *Coprinus*-like in general appearance; pileus merely an expanded disk of the summit of the columella

[8] Montagne, J. F. C. Sylloge generum specierumque cryptogamarum. Paris, 1861. (See pp. 129–130.)

(stem), 1–3.5 cm. broad, tapered to a very thin edge, convex then plane to depressed, surface smooth, white or grayish, usually with remnants of the volva at the center and sometimes extending nearly to the margin; gleba lamelloid, entirely free from the main columella, attached to the margin of the discoid pileus, ventricos rounded below; lamella crowded, ventricose-rounded, black, of light fuscus hyphae, 1–3.5 cm. long, 4–12 mm. broad; columella-stipe 8–30 cm. long, 4–26 mm. in diam. above usually tapering downward, hollow, white fleshed, becoming almost woody on drying, surface smooth to striate, often becoming scaly or lacerate, white or whitish; volva usually double, the outer white more or less ample, usually covered with adherent sand, the inner lacerate, of tough fibrous strands; paraphyses broadly clavate, somewhat fuscus; basidia clavate or pyriform, somewhat fuscus, 4-spored, almost square at the distal end with blunt sterigmata at the corners, so to speak, 20–28 × 10–14 μ; spores almost sessile, borne acrogenously, dark fuscus with a more or less hyaline germ pore at the distal end, ellipsoid to obovoid, 12–19 × 6–11.2 μ.

This species as the name implies grows in sandy places, usually in the open sunlight. The plants are scattered or gregarious. Whole fields of thousands of specimens have been reported in eastern Oregon. Usually the stipe is about one-half to two-thirds buried in the sand. If the specimens are pulled up the volva is usually left in the ground.

The double volva is rather inconspicuous in some specimens. The inner portion is very lacerate and has some characteristics of columella (stem) tissue. A study of the developmental morphology through the young stages of the sporophore is needed to aid in an interpretation of origin of these fundamental tissues.

This one American species is extremely variable in stature according to the conditions under which it may be found. An attempt, however, to segregate slender growth forms which may be classed as approaching *M. tenuis* Pat. fails when the whole morphological picture is considered. Specimens from sandy dune-like ridges high up on the north side of Mt. Shasta, California, are small and rather slender, actually about 6–14 cm. tall. Nevertheless they do not attain the gracility or appearance of *M. tenuis*. From the broad, dry, plateau-like expanses of eastern Oregon or lower altitudes of California the specimens are intermediate in size, while in the southern range of *M. arenarius*, in Texas, New Mex-

ico, Arizona, and southern California, the fungus attains its greatest stature, with a stem up to a height of 25–30 cm., and diameter proportionate, up to 2.6 cm. above, tapering downward. But along with these larger specimens, however, will be smaller ones similar to those found in the northern range of distribution.

Mention should be made here of the very conservative attitude of Hollos [9] who has included practically all described species under his *Montagnites radiosus*. For instance, *M. Elliotti* Mass. which was discovered by Scott-Elliott in the Nile Valley, Egypt (*not* "New Zealand" as erroneously stated in Sacc. Syll. Fung. **11**: 79 and copied by Hollos and others), is a species distinct and apart from *M. arenarius*. The stem tissues are distinct, composed of silky longitudinal fibers not like those in *M. arenarius*. The spores in the type of *M. Elliotti* (in N. Y. Bot. Gard. Herb.) are ovate and 6–7.75 × 4.5–5 μ, instead of "12 × 7" as described by Massee (Grevillea **11**: 1. 1892). Hollos has also included here *Polyplocium californicum* Harkness, which has already been discussed under *Gyrophragmium*, and *M. tenuis* Pat. The latter seems quite distinct from *M. arenarius* if Patouillard's description is accurate and it doubtless is, for specimens from the Galapagos Islands (in U. of Calif. Herb.) correspond to his description. In these the spores are ellipsoid, obovoid or angular, with thick rather clear walls, and measure 5–6.5 × 4–4.5 μ.

Specimens examined:

Texas: *W. H. Long*, No. 4, 1901, no data (in Herb. N. Y. Bot. Gard.); Travis County, Austin, *W. H. Long*, No. 317, 1901 (in Farlow herb. under the name *Montagnites texensis* Berk.).

New Mexico: Bernalillo county, Albuquerque, *W. H. Long*, Feb. 4, 1933 (in Herb. U. Calif.) and No. 10256, May, 1942 (in Zeller Herb.); Dona Ana county, Mersilla, *H. L. Barnett*, Aug., 1938 (in Zeller Herb.).

Arizona: Navajo county, Oraibi-Leupp road, *A. F. Whiting*, Aug. 24, 1936 (in Herb. Mus. N. Ariz. No. 814/2615, also in Herb. U. Mich.).

Oregon: Crook county, 6 miles E. of Redmond, *Max Doty*, May 5, 1938 (in Zeller Herb.); Deschutes county, *S. M. Zeller*, June 23,

[9] Loc. cit. (See pp. 30–32 and *T. 1–2.*)

1929; Grant county, *R. E. Brooke,* May 27, 1940 (in Zeller Herb.).

California: Southern Calif., *A. J. McClutchie,* no data (in Herb. N. Y. Bot. Gard.); Los Angeles county, Dry Lake near Lancaster, *H. E. Bailey,* Apr. 3, 1942 (in Herb. U. Calif.); Riverside county, Elsinore, *A. J. McClutchie,* Mar. 28, 1896 (in Herb. N. Y. Bot. Gard.), *Mr. and Mrs. T. S. Brandegee* (in Zeller Herb.), Riverside, *C. O. Smith,* Mar. 26, 1937 (in Herb. U. Calif.); San Bernardino county, Forest Home, *H. K. Rusby,* Sept., 1909 (in Herb. N. Y. Bot. Gard.), *Kramer, T. S.* and *K. L. Brandegee,* May, 1914 (in Herbs. U. Calif. et N. Y. Bot. Gard.), Mohave Desert, *H. W. Harkness,* June, and San Bernardino, *John A. Anderson,* 1940 (both in Herb. N. Y. Bot. Gard.).

Mexico: Baja California, El Alamo, *James McMurphy* & *Wiggins,* April 28, 1931 (No. 46) (in Zeller Herb. and Lloyd collections).

U. S. S. R. (Russia): Transcaucasia, Elizavetopol, *G. Woronow,* No. 30 (Fungi Caucasici, in Herb. N. Y. Bot. Gard.).

Africa: Algeria, *Trabut,* July, 1908 (in Herb. Patouillard at Farlow Herb., Harvard U.).

Nearly all specimens cited above are accessioned in herbaria under the name *Montagnites Candollei* Fries.

OREGON STATE COLLEGE,
CORVALLIS, OREGON

SOME SOUTHERN NOVELTIES

WILLIAM A. MURRILL

The specimens cited in this paper, belonging to various groups of fleshy fungi, are deposited in the herbarium of the Florida Agricultural Experiment Station, at Gainesville.

Armillaria floridana sp. nov.

Pileo convexo-plano, 4.5 cm. lato, glabro, umbrino-isabellino; sporis subglobosis, hyalinis, 4 μ; stipite albo, 3 × 0.7–0.9 cm., annulo albo, parvo.

Pileus convex to plane and finally slightly depressed, not umbonate, 4.5 cm. broad; surface somewhat viscid, uneven, glabrous, uniformly umbrinous-isabelline or slightly darker on the disk, margin even, undulate; context white, unchanging, odor faint and pleasant; lamellae deeply emarginate, just touching the stipe, broad, ventricose, rather close, inserted, entire, fragile, white, isabelline when dry; spores subglobose, smooth, hyaline, uniguttulate, about 4 μ; stipe subfusiform, not bulbous, white, smooth, dry and glabrous above the annulus, viscid and floccose-squamulose below, about 3 × 0.7–0.9 cm.; annullus median, small, white, persistent.

Type collected by W. A. Murrill in humus under an oak at Gainesville, Fla., July 7, 1938 (*F 17467*). Only two hymenophores were found, growing a few inches apart. They suggested nothing with which I am acquainted, either in *Armillaria* or *Lepiota*. No cystidia of any kind were seen and the spores are not amyloid. Dr. Singer would probably refer the species to *Limacella*.

Armillaria graveolens sp. nov.

Pileo convexo-plano, 4–6 cm. lato, glabro, viscido, isabellino, nauseoso, margine appendiculato; sporis globosis, albis, 6.5 μ; stipite albo, glabro, 4–6 × 0.5–1 cm.; annulo parvo, fibroso, albo.

Pileus convex to plane, scattered, 4–6 cm. broad; surface distinctly viscid, glabrous, uneven, isabelline, somewhat darker on the disk; margin projecting, decidedly appendiculate; context soft, white, unchanging, taste very farinaceous, odor strong, earthy-farinaceous; lamellae adnexed, narrow, crowded, inserted, soft, en-

tire, milk-white, unchanging; spores globose, smooth, hyaline, granular, about 6.5 μ; stipe fleshy, solid, equal or slightly tapering upward, not at all viscid, not separating, smooth, white and glabrous above, scurfy near the base with rosy-isabelline remains of the veil, 4–6 $\times$ 0.5–1 cm.; veil mostly breaking up, leaving a double ring-trace near the base of the stipe.

Type collected by W. A. Murrill in moist, sandy soil under a camphor tree in Gainesville, Fla., July 27, 1941 (*F 21435*). The objectionable odor was distinct in the open air and became almost unbearable in a closed room, suggesting a shock of rotting wheat. No cystidia were observed and the spores are not amyloid. According to Dr. Singer's classification the species would probably go into *Limacella*.

Armillaria raphanica sp. nov.

Pileo convexo-expanso, gregario, 5–7 cm. lato, glabro, rosei-isabellino, appendiculato, raphanico; lamellis adnatis, angustibus, confertis, albis, sporis oblongo-ellipsoideis, 5 $\times$ 2 μ; stipite albo, fibrilloso-squamuloso, 3–5 $\times$ 0.4–0.6 cm.

Pileus convex to expanded, slightly depressed at times, gregarious to subcespitose, 5–7 cm. broad; surface smooth, glabrous, rosy-isabelline, a little darker at the center, margin incurved, even, entire, appendiculate; context very thin, white, unchanging, not fragile, odorless when fresh, with the taste of radishes; lamellae adnate, seceding, very narrow and very close, entire, some inserted and a few forked, white or pallid; spores oblong-ellipsoid, obliquely apiculate, smooth, hyaline, about 5 $\times$ 2 μ; stipe tapering downward, solid, cartilaginous to subligneous, fibrillose-squamulose, white throughout or brownish below, 3–5 $\times$ 0.4–0.6 cm.; veil evanescent, leaving no annulus.

Type collected by E. West and W. A. Murrill on a hardwood log in Sanchez Hammock, near Gainesville, Fla., July 23, 1938 (*F 17949*). Suggesting *A. Boryana* (Berk. & Mont.) Murrill but differing in closer, narrower gills, etc. In the drying oven the odor of radishes becomes very pronounced. According to the latest classification species of the old genus *Armillaria* are scattered among several genera. This one, with its non-amyloid, cylindric, smooth spores and no cystidia would be placed by some in the genus *Lentinus*.

Camarophyllus translucens sp. nov.

Pileo umbilicato, albo, 1 cm. lato; lamellis decurrentibus, praedistantibus, albis; sporis subglobosis, 5 μ, stipite albo, 1.5 $\times$ 0.15 cm.

Pileus umbilicate, gregarious, 1 cm. broad; surface moist but not viscid, smooth, glabrous, white, translucent, showing the gills, margin deflexed, entire; context membranous, subhyaline, odorless; lamellae decurrent, few, distant, broad, inserted, entire, white; spores subglobose, smooth, hyaline, 5 μ; cystidia none; stipe subequal, smooth, glabrous, white, translucent, 1.5 $\times$ 0.15 cm.

Type collected by W. A. Murrill in moist earth under hardwood trees in Planera Hammock, eleven miles northwest of Gainesville, Fla., August 13, 1938 (*F 18045*). A small, dainty species, very virginal in appearance.

Cortinellus subdecorosus sp. nov.

Pileo convexo ad depresso-subumbonato, 3.5 cm. lato, fulvo, praespinuloso; sporis 4–5 μ, cystidiis praemagnis; stipite glabro, 4 $\times$ 0.4 cm.

Pileus convex to slightly depressed, gregarious, 3.5 cm. broad; surface dry, fulvous, slightly darker on the small umbo, densely adorned with long, slender spines; margin even, lobed; context thin, white, mild; lamellae sinuate, close, narrow, inserted, pallid, beautifully fringed; spores subglobose to broadly ellipsoid, smooth, hyaline, obliquely apiculate, uniguttulate, 4–5 μ long; cystidia on edges of gills enormous, subcylindric to ten-pin shape, smooth, hyaline, about 20 μ thick and projecting 40–45 μ; stipe pale-isabelline, smooth, equal, pruinose at the apex, glabrous below, 4 $\times$ 0.4 cm.

Type collected by West and Murrill on a hardwood log in wet ground in Sugarfoot Hammock, near Gainesville, Fla., August 4, 1938 (*F 18052*). Suggesting *C. decorosus* (Peck) Murrill but having a glabrous stem and other distinctive characters. The marginal cystidia are quite impressive.

Cortinellus totilividus sp. nov.

Pileo convexo-expanso, 6–8 cm. lato, hirto-tomentoso, livido; lamellis sinuatis, lividis; sporis ovoideis, 5–6 $\times$ 4 μ; cystidiis fusoideis, lividis; stipite hirto-tomentoso, livido, 5 $\times$ 1.5 cm.

Pileus convex to expanded, slightly depressed, gregarious or cespitose, 6–8 cm. broad; surface dry, hirtose-tomentose, uniformly

lividous, margin even, entire to slightly lobed; context white, unchanging, odorless, mild; lamellae sinuate, broad behind, inserted, rather crowded, entire, lividous; spores ovoid, smooth, hyaline, 1-guttulate, about 5–6 × 4 μ; cystidia plentiful, fusoid, lividous, about 15 μ thick at the middle, projecting about 40 μ; stipe swollen below, colored and clothed like the pileus, yellow within, about 5 × 1.5 cm.

Type collected by W. A. Murrill on moist humus in a low hammock at Juniper Springs, Marion Co., Fla., Sept. 17, 1939 (*F 18745*). A very striking hymenophore, brilliantly colored, with large livid cystidia visible through a hand-lens. With age and on drying the surface of both cap and stem usually shows isabelline or umbrinous tints.

Geopetalum suballiaceum sp. nov.

Pileo dimidiato, 2–2.5 cm. lato, albo; lamellis distantibus, albis, sporis 6–7 × 4 μ, cystidiis fusoideis, 60–75 × 15 μ.

Pileus dimidiate or flabelliform, attached by a narrow base, gregarious, 2–2.5 cm. broad; surface smooth, slightly pruinose behind, whitish, opaque, becoming slightly yellowish on drying and striate over the lamellae, margin often lobed; context membranous, white, odorless; lamellae distant, inserted, white, entire, yellowish with a brownish tint when dry; spores ellipsoid or ovoid, smooth, hyaline, about 6–7 × 4 μ; cystidia oblong-fusoid with short stalk and acute or blunt tip, hyaline, about 60–75 × 15 μ.

Type collected by W. A. Murrill on a much-decayed hardwood log in a high hammock at Gainesville, Fla., July 1, 1938 (*F 17310*). The flesh is so thin that the gills show through when dried. The cystidia are much like those found in *G. petaloides* (Bull.) Pat.

Gymnopus alliaceus sp. nov.

Pileo convexo, 6–8 cm. lato, pallido, alliaceo; lamellis adnatis, angustatis, sporis ellipsoideis, 5–6 × 4 μ; stipite excentrico, pallido, 2–3 × 0.3–1 cm.

Pileus subcircular, convex, gregarious, 6–8 cm. broad; surface opaque, smooth, glabrous, pallid or rosy-isabelline, margin even, often lobed; context thin, whitish, with a strong odor of onions and a distinct taste of radishes; lamellae adnate, seceding, arcuate, narrow, crowded, entire, pallid to rosy-isabelline; spores broadly ellipsoid, smooth, hyaline, uniguttulate, 5–6 × 4 μ; cystidia none;

stipe eccentric, curved, tough to almost woody, tomentose, enlarged and striate above, white or rosy-isabelline, solid, scaly below, 2–3 × 0.3–1 cm.

Type collected by W. A. Murrill on the side of a rotten oak log in a low hammock at Magnesia Springs, Fla., August 15, 1938 (*F 17940*). The odor develops as the hymenophore begins to dry. The eccentric stipe may be due to its position on the log.

Lentodium floridanum sp. nov.

Pileo depresso, squamuloso, 2–3.5 cm. lato; lamellis adnatis, confertis, albis; sporis ellipsoideis, 5 × 3 μ; stipite floccoso-squamuloso, 1.5 × 0.3–0.5 cm.; velo appendiculato, parvo.

Pileus subcircular or irregular, convex to depressed, at times umbilicate, gregarious, 2–3.5 cm. broad; surface dry, squamulose, white with bay disk and bay, pointed scales, margin pallid, even, lobed; context very thin, white, unchanging; lamellae squarely adnate, close, narrow, white, entire to slightly undulate or notched; spores ellipsoid, smooth, hyaline, usually 1-guttulate, about 5 × 3 μ; stipe tapering downward, solid, floccose-squamulose, white above, bay below, 1.5 × 0.3–0.5 cm.; veil slight, remaining in fragments on the margin but not forming an annulus.

Type collected by W. A. Murrill on a hardwood log in Beech Woods, near Santa Fé, Alachua Co., Fla., July 13, 1938 (*F 17876*). Found but once.

Limacella roseola sp. nov.

Pileo umbonato, 5 cm. lato, roseo; lamellis pallide-roseis; sporis subglobosis, hyalinis, 6–7 × 5–6 μ; stipite pallide-roseo, 7 cm. longo; annulo medio.

Pileus convex to expanded, umbonate, solitary, about 5 cm. broad; surface smooth, glabrous, rose-pink, slightly darker roseous on the umbo, margin even, entire; lamellae rose-tinted, just touching the stipe, rather broad and crowded, entire; spores subglobose, smooth, hyaline, 6–7 × 5–6 μ; stipe slender, tapering upward, smooth, subglabrous, pale-roseous, about 7 cm. long; annulus median, evanescent.

Type collected by W. A. Murrill in humus in a hollow tree at Lynchburg, Va., Sept. 16, 1926 (*F 16061*). A very beautiful species, found only once. The texture is soft and the pileus of light

weight but the stem is solid. The spores were measured by Mr. West. Dr. Singer thinks they are 3.8–5 × 3.2–3.8 μ. There are minute droplets inside the wall whose refraction gives a rough or reticulate appearance, as occurs at times in *L. illinita*. The walls of the cuticular hyphae are slightly gelatinous in KOH solution.

Marasmiellus Violae sp. nov.

Pileo subcirculari, convexo, 1–2 mm. lato, albo, margine incurvo; lamellis adnatis, distantibus, albis; stipite eccentrico, albo, 0.5 mm. longo.

Pileus irregularly circular, convex to subexpanded, 1–2 mm. broad; surface finely pubescent, white, margin even, entire, incurved; context membranous, white; lamellae adnate, few, distant, narrow, inserted, white, edges thick, entire; stipe eccentric, curved, subequal, slender, subglabrous, white, about 0.5 mm. long.

Type collected by W. A. Murrill on the under side of green leaves of *Viola villosa* in Gainesville, Fla., July 25, 1939 (*F 19742*). Evidently parasitic and not associated with *Cercospora Violae*, which is common on this host. The cap of this dainty little agaric presses closely against the lower surface of the leaf. The nearest relative is probably *M. inconspicuus* Murrill, described from Cuba. Although satisfactory spore characters have not been obtained I think it best to publish the species so that others may be on the lookout for it.

Venenarius odoriferus sp. nov.

Pileo convexo-plano, 10–14 cm. lato, floccoso-squamuloso, albo; sporis ellipsoideis, 7–10 × 5–7 μ; stipite albo, globoso-bulboso, 8–14 × 1–2 cm.; volva veloque evanescentibus.

Pileus convex to plane, gregarious, 10–14 cm. broad; surface white, densely covered with small, erect, floccose squamules, margin entire, even; context white, with a peculiar, penetrating, rather pleasant odor, which becomes stronger and persists in dried specimens; lamellae adnexed, medium distant, rather narrow, inserted, white, edges slightly fringed; spores oblong-ellipsoid, smooth, hyaline, granular, 7–10 × 5–7 μ; stipe equal and 8–14 × 1–2 cm. above the bulb, white, clothed like the pileus; bulb globose, not radicate, 3–5 cm. thick; volva breaking up and leaving no limb; veil clinging for a time to the margin of the pileus in large, white, membranous fragments, leaving no annulus.

Type collected by West, Arnold and Murrill on the ground in dry oak-pine woods at Sugarfoot, near Gainesville, Fla., July 11, 1938 (*F 17684*). Also collected by W. A. Murrill in mixed woods of loblolly pine and turkey oak at Gainesville, June 10, 1938 (*F 17656*); and under a live-oak, July 6, 1938 (*F 17683*). A very handsome species, resembling *V. solitarius* but having a dense, uniform covering of small scales instead of sharp warts and an odor unlike that of any other fungus known to me. It has no resemblance to chloride of lime but suggests some faintly scented soap or freshly-steamed bone slightly flavored with caramel. This odor persists for several years in the herbarium.

Venenarius submutabilis sp. nov.

Pileo convexo-plano, 6–10 cm. lato, albo, rubescente; lamellis latis, sporis 10–12 × 5–6 μ; stipite albo, bulboso, 8–13 × 1.5–2 cm.; annulo amplo, volva lobata.

Hymenophore white throughout, all parts changing in 2–5 minutes when cut or bruised to roseous and later to subincarnate, fading back to white within an hour. Pileus convex to plane, usually with a few flat volval fragments, scattered, 6–10 cm. broad; surface dry, smooth, margin entire, even; context odorless or smelling faintly of anise; lamellae free or adnexed, ventricose, rounded behind, inserted, medium distant, broad, entire; spores oblong-ellipsoid, smooth, hyaline, granular, 10–12 × 5–6 μ; stipe equal above the bulb, mostly hollow, glabrous and finely ridged at the apex, fibrillose below, 8–13 × 1.5–2 cm.; annulus ample, skirt-like, fixed 0.5–2 cm. from the apex; bulb globose to ovoid, 3–5 × 3–4 cm.; volva cuplike, ample, white, persistent, with free, lobed margin.

Type collected by W. A. Murrill in a high hammock at Burnett's Lake, Alachua Co., Fla., Sep. 24, 1941 (*F 20004*). Also collected several times in the vicinity of Gainesville, both under oaks and pines. Differing from *V. anisatus* Murrill in changing color and from *A. mutabilis* Beardslee in its smaller spores and lobed volva.

CHAMAEOTA MAMMILLATA (Longyear) Murrill

Pileus convex to nearly plane, not umbonate, cespitose, about 5 cm. broad; surface dry, scabrous, especially in the center, neither

rugose nor striate, colored a beautiful yellow with an orange tint; context very thin, pale yellowish; lamellae free, ventricose, crowded, pale rose-pink; spores salmon-colored in mass, subglobose, smooth, 6–7 μ; stipe slender, tapering upward, white with a faint yellowish tint, about 5 cm. long; annulus median, fixed, persistent, ample, pale-yellow.

Previously known only from Michigan. The specimens above described, which are deposited in the herbarium at Gainesville, were collected by the author on dead wood in deciduous woods at Lynchburg, Va., Sept. 3, 1926. These notes on the fresh specimens will be seen to differ in several particulars from descriptions previously published of this interesting species. In 1938 four collections were made of it on dead hardwood near Gainesville, Fla.

Claudopus cyaneus sp. nov.

Pileo dimidiato, 1.5–2 cm. lato, cyaneo; lamellis subcoeruleis, sporis angulatis, 10 × 6 μ; stipite excentrico, minuto, albo.

Pileus dimidiate, conchate, gregarious, 1.5–2 cm. broad; surface smooth, finely tomentose, especially behind, uniformly cyaneous, margin even, entire or lobed; context very thin, pallid, odor and taste decidedly farinaceous; lamellae adnate, broad behind, inserted, subdistant, entire, pale coeruleous, soon becoming pink; spores very angular, 1–2-guttulate, pink, about 10 × 6 μ; stipe very eccentric, curved, short, white, tomentose, about 3 × 1.5 mm.

Type collected by E. West, Lillian Arnold and W. A. Murrill on hardwood logs in Planera Hammock, eleven miles northwest of Gainesville, Fla., July 16, 1938 (*F 17841*). This dainty, dark-blue species with angular spores, first discovered by Miss Arnold, could hardly be confused with anything else. I consider it an outstanding addition to the fungous flora of Alachua County.

Lepista panaeoliformis sp. nov.

Pileo convexo-expanso, 5–8 cm. lato, subhispido, atriavellaneo, sapore grato; lamellis sinuatis, albis; sporis ellipsoideis, subroseis, 6–7 × 3–4 μ; stipite solido, albo, glabro, 3–4 × 1–1.5 cm.

Pileus convex to subexpanded, often gibbous, gregarious, 5–8 cm. broad; surface dry, smooth, uniformly dark avellaneous, with minute concolorous tufts of fibrils more persistent on the disk,

margin incurved, sterile, even, entire to undulate or at times lobed; context thick, soft, whitish, unchanging, sweet and nutty with anise odor; lamellae sinuate, crowded, rather narrow, broadest behind, inserted, white to pale pink, entire to undulate or notched; spores ellipsoid, smooth, 1-guttulate, dull pink in mass, 6–7 × 3–4 μ; cystidia none; stipe solid, fleshy, equal or enlarged below, smooth, glabrous, milk-white, unchanging, 3–4 × 1–1.5 cm.

Type collected by W. A. Murrill in shaded leaf-mold by a bayhead in Gainesville, Fla., Oct. 7, 1942 (*F 15722*). Very shapely and attractive; probably edible. Not found elsewhere.

Pluteus floridanus sp. nov.

Pileo convexo-subexpanso, umbonato, 2 cm. lato, squamuloso, striato, nigro-fuliginoso; sporis globosis, 4.5–5 μ, cystidiis obtusis, 30× 10 μ, stipite ermineo, 3 × 0.1–0.2 cm.

Pileus convex to subexpanded, with a small umbo, solitary, 2 cm. broad; surface dry, squamulose, long-rimose-striate, shining blackish-fuliginous; context thin, white, unchanging; lamellae remote, medium broad, crowded, ventricose, inserted, entire, soon becoming pink; spores copious, globose, smooth, pink, uniguttulate, 4.5–5 μ; cystidia abundant, flask-shaped, smooth, hyaline, obtuse, about 10–15 μ thick and projecting about 30 μ; stipe tapering upward, shining satiny-white, smooth, glabrous, 3 × 0.1–0.2 cm.

Type collected by W. A. Murrill on a rotten hardwood log in woods at Gainesville, Fla., July 7, 1938 (*F 17469*). An attractive species, with shining-black, long-striate cap, satiny-white stem, and very regular, globose spores measuring not over 5 μ. The large hyaline cystidia may be seen in abundance with a hand-lens on the sides of the fresh gills.

Crepidotus amarus sp. nov.

Pileo convexo, reniformi, 5–8 mm. lato, albo, amaro; lamellis distantibus, albis ad fulvis, sporis 5–7 × 4–5 μ; stipite eccentrico, brevi, albo.

Pileus reniform or subcircular, convex, not resupinate at first, gregarious, 5–8 mm. broad; surface uniformly white, unchanging, pulverulent, margin entire, slightly striate at times; context thin, white, very bitter at once; lamellae adnexed, broad at the base, distant, inserted, whitish with beaded, fimbriate edge, becoming fulvous with white edge; spores ellipsoid or ovoid, smooth, pale

yellowish-brown, many uniguttulate, 5–7 × 4–5 μ; stipe always present, eccentric, short, slender, curved, white.

Type collected by W. A. Murrill on a dead grapevine stem in a high hammock at Gainesville, Fla., June 28, 1938 (*F 17226*). Noteworthy because of its small size, its bitter taste, and its small, curved stipe. The very youngest hymenophores showed no tendency toward being resupinate. The spores are perfectly smooth.

Naucoria semiorbicularis lacunosa var. nov.

Pileo convexo, 2–3 cm. lato, glabro, cremeo, praelacunoso, farinaceo; stipite 3–4 × 0.3 cm.

Pileus convex, gregarious, 2–3 cm. broad; surface glabrous, cremeous, conspicuously and deeply pitted except at the very center; context farinaceous; stipe pallid above, cremeous below, 3–4 × 0.3 cm.

Type collected by W. A. Murrill on an exposed lawn in Gainesville, Florida, July 26, 1938 (*F 17958*). In a large collection of hymenophores every cap was deeply pitted; even the young ones only a few millimeters in diameter. No trace of a veil was observed. The spores were typical for the species, having a purplish tint in mass suggestive of *Stropharia*. This variety is very common about Gainesville and is always distinctive.

Coprinus praemagnus sp. nov.

Pileo cylindrico ad subcampanulato, 10 × 7 cm., albo, squamuloso, striato; lamellis confertis, angustatis, albis; sporis ovoideis, 15–18 × 8–10 μ; cystidiis 65 × 12 μ; stipite cylindrico, glabro, albo, praeradicato, 8 × 2 cm.; annulo parvo, albo, persistente.

Pileus cylindric to subcampanulate, solitary, 10 × 7 cm.; surface white, finely striate, with a few small reflexed scales, margin entire; context thin, white, odorless, with nutty flavor; lamellae narrow, crowded, white at first, at length becoming black and melting away; spores ovoid, smooth, black, truncate, granular, about 15–18 × 8–10 μ; cystidia narrowly flask-shaped with tapering neck, hyaline, about 65 × 12 μ; stipe equal, smooth, glabrous, white, long-radicate, 8 × 2 cm.; root 7 cm.; annulus small, persistent, fixed 2 cm. above the base of the stipe.

Type collected by W. A. Murrill in leaf-mold in a high hammock on the Newberry Road, seven miles west of Gainesville, Florida, Jan. 4, 1940 (*F 19294*). The largest species we have, measuring a foot in height, counting the root. It is evidently a wild woodland type unassociated with cultivated land or manure heaps. This spot was carefully watched by Mr. J. R. Watson and myself for three years without finding additional hymenophores. However, another collection was made several miles distant in March, 1942. The species resembles *C. comatus* in some ways but is larger and occurs in a different habitat.

Gomphidius foliiporus sp. nov.

Pileo convexo-plano, 6–7.5 cm. lato, subtomentoso, testaceo-fulvo; lamellis decurrentibus, sporis fusoideis, 12 × 5 μ; stipite tomentoso, subconcolori, 3–5 × 0.6–1 cm.

Pileus circular, convex to plane or slightly depressed, solitary or gregarious, 6–7.5 cm. broad; surface dry, smooth, subtomentose, uniformly testaceous-fulvous, sometimes with bay center in age; margin even, entire, hispid-tomentose, dark-blue where bruised; context 1–2 cm. thick, odorless, sweet and nutty, pallid, slightly bluish when cut; lamellae decurrent, broad, inserted, subdistant, entire, often anastomosing to form large pores, pallid, dark-blue when bruised, at length dark-brown; spores boat-shaped, smooth, pale-umbrinous, umbrinous or purplish-brown in mass, about 12 × 5 μ; cystidia none; stipe central, equal, solid, striate, dry, tomentose, pale testaceous or yellowish-white, often fulvous below, 3–5 × 0.6–1 cm.

Type collected by E. West, L. Arnold and W. A. Murrill under an oak in Sugarfoot Hammock, near Gainesville, Fla., July 11, 1938 (*F 17747*). Also collected the next day near the same place by the same persons on a rotten pine stump under oaks (*F 17774*), and the day following in soil under a pine (*F 17775*).

This species is one of those puzzles that cause loss of sleep. When first sighted I thought of *Stropharia,* but the gills were too decurrent. Although showing kinship with *Phylloporus* and *Paxillus,* the spores were far too dark. I am placing it with *Gomphidius* temporarily because there is no other place for it to go, brushing aside for the moment several obvious and good reasons for not doing so.

NEW COMBINATIONS

For those using Saccardo the following species are recombined:

Camarophyllus translucens	= **Hygrophorus translucens**
Cortinellus subdecorosus	= **Tricholoma subdecorosum**
Cortinellus totilividus	= **Tricholoma totilividum**
Geopetalum suballiaceum	= **Pleurotus suballiaceus**
Gymnopus alliaceus	= **Collybia alliacea**
Lentodium floridanum	= **Lentinus floridanus**
Lepista panaeoliformis	= **Tricholoma panaecliforme**
Limacella roseola	= **Lepiota roseola**
Marasmiellus violae	= **Marasmius violae**
Venenarius odoriferus	= **Amanita odorifera**
Venenarius submutabilis	= **Amanita submutabilis**

FLA. AGR. EXP. STATION,
GAINESVILLE, FLA.

ADDITIONS TO THE UREDINALES OF VENEZUELA—II [1]

FRANK D. KERN AND H. W. THURSTON, JR.

There are two rather extensive lists of Venezuelan Uredinales. The first of these was published in 1930 by H. Sydow in Fungi venezuelani (Ann. Myc. **28**: 29–224, Uredinales, pp. 37–52). There are 65 species in that list. The second list was published by Kern, Thurston, and Whetzel in 1934 in Mycological Explorations of Puerto Rico (Monographs of the University of Puerto Rico, Series B., No. 2, Uredinales, pp. 262–303). That list recorded 184 species as the total number known to the authors at that time. Later it was discovered that one species had been reported under two names so that the total number should have been 183. Additions were made by Kern in 1938 (Mycologia **30**: 537–552) to the extent of 22 species.

We are now adding 33 species belonging to 11 genera, bringing the total up to 238. It should be understood that this total is based on the foregoing lists. These include the record of nine species by Patouillard and Gaillard in 1887 (Bull. Soc. Myc. France **4**: 7–46). We have not made an extensive search of the literature for incidental references to species. It cannot be claimed that these necessarily constitute first reports from Venezuela, although it seems likely that such may be the case with most of the species.

Several collectors have made possible the additions here presented. Their collections are deposited at Cornell University in the Department of Plant Pathology, being recent additions to a large collection known as "The Fungi of Venezuela." Duplicates

[1] Contribution from the Department of Botany, The Pennsylvania State College, No. 136. Publication authorized on January 18, 1943, as paper No. 1158 in the Journal Series of The Pennsylvania Agricultural Experiment Station.

In the September–October number of MYCOLOGIA, 1938 (**30**: 537–552) there appeared a paper by the senior author entitled "Additions to the Uredinales of Venezuela." That paper was in reality No. I in this series although it was not so identified when published.

of many of the rust specimens in this collection are deposited at The Pennsylvania State College in the Department of Botany. The herbarium numbers cited in this paper are those from this consecutively numbered collection. Doctor Carlos E. Chardon, now Director of the Institute of Tropical Agriculture, Mayaguez, Puerto Rico, resided in Venezuela from 1938 to 1941, and added to the collections which he had made on a previous exploration in 1937. Mr. A. S. Müller was plant pathologist at the Federal Agricultural Experiment Station, El Valle, during the years 1937 to 1941, and made numerous collections. Professor H. H. Whetzel, of Cornell University, made a collecting trip to Venezuela during the months of February, March, and April, 1939, and brought back many specimens. Professor M. F. Barrus, also of Cornell University, was in Venezuela from October, 1939 to March, 1940 and spent some time collecting fungi. Through influence exerted by these collectors some Venezuelan scientists became interested and have made their contributions. Among these should be mentioned Sr. Francisco Tamayo and Sr. V. Badillo.

We are indebted to all of these men whose collecting has made possible these studies. We are also indebted to numerous systematic botanists for aid in the determination of the hosts. Without such assistance our work could not be carried on with despatch and accuracy.

AECIDIUM BYRSONIMATIS P. Henn. Hedwigia **34**: 101. 1895.

on *Brysonima crassifolia* H. B. K. road beyond Ortiz, entrance to Llanos, Est. Guarica, April 7, 1939, *H. H. Whetzel & A. S. Müller 3365;* savannas near Churruscao, west of San Fernando de Apure, Est. Apure, April 15, 1939, *C. E. Chardon 3433.*

The pycnia and aecia of this species are produced by an unlimited mycelium which causes extensive hypertrophy of leaves and branches. The white aecia are large and conspicuous. Whetzel collected *Crossopsora notata* Arth. (specimen No. *3364*) at the same place with No. *3365* and has indicated his belief that this aecial stage may belong in an autoecious life cycle with *Crossopsora notata.* This same suggestion was made by Arthur (Mem.

Torrey Club **17**: 114) in 1918. Jackson (Mycologia **23**: 361) has also proposed that *Crossopsora notata* might be an autoecious species with an aecial stage. However he did not have in mind *Aecidium Byrsonimatis* P. Henn., but a different type of aecidium which he described as *Aecidium vinulum* Jacks. & Holw. on *Byrsonima intermedia* from Brazil. We must conclude that the relationship of *Aecidium Byrsonimatis* is uncertain.

AECIDIUM GUATEMALENSE Kern & Kellerm. Jour. Myc. **13**: 23. 1907.

on *Heliotropium indicum* L. banks of Neveri, near Barcelona, Est. Anzoategus, May 26, 1938, *C. E. Chardon 2669*.

So far as we know, this is the second collection of the species. The type was collected in Guatemala by W. A. Kellerman in 1905. The correlated microcyclic species, *Puccinia Heliotropii* Kern & Kellerm., has been reported from Venezuela.

AECIDIUM XANTHOXYLINUM Speg. Rev. Argent. Hist. Nat. Buenos Aires **1**: 400. 1891.

on *Fagara* sp. aff. *rhoifolia* Engl. (*Xanthoxylon*), forest clearings, Central Lucinda, Est. Carabobo, April 13, 1938, *C. E. Chardon 2591*.

The type locality is in Paraguay. It has also been reported from Brazil.

ANGIOPSORA COMPRESSA Mains, Mycologia **26**: 129. 1934.

on *Paspalum conjugatum* Berg. *Chardon, Toro & Alamo 189* (in previous list as *P. tubulosa*).

Paspalum decumbens Sw. *Kern & Toro 1710* (in previous list as *P. tubulosa*).

Paspalum Humboldtianum Flügge, *Chardon, Toro & Alamo 345* (in previous list as *P. tubulosa*); Galipan, Dist. Federal, April 23, 1934, *Kern & Toro 1693, 1698a*.

Paspalum paniculatum L. Rancho Grande, road Maracay to Ocumare de la Costa, Est. Aragua, March 24, 1939, *H. H. Whetzel 3106*.

Paspalum plicatulum Michx. Monumento Carabobo, Est. Carabobo, Nov. 9, 1939, *Barrus & Müller 3627*.

This species was originally described as *Puccinia compressa* by Arthur & Holway (Arth. Proc. Am. Phil. Soc. **64**: 157. 1925) on *Paspalum elongatum* from Bolivia. Only the uredo stage is present in our specimens. We are indebted to Dr. G. B. Cummins for checking this determination. Both Arthur and Mains have included illustrations in their papers.

MAINSIA LAGERHEIMII (P. Magn.) Jacks. & Holw. Mycologia **23**: 110. 1931.

on *Rubus robustus* Presl. San Antonio de los Altos, Est. Miranda, Nov. 5, 1939, *Barrus & Müller 3669; Rubus* sp. San Antonio de los Altos, Est. Miranda, May 14, 1938, *C. E. Chardon 2655;* forests near Papelon, above Caracas, Dist. Federal, July 8, 1938, *C. E. Chardon 2718;* Caracas a Colonia Tovar, Dist. Federal, March 17, 1939, *Whetzel & Müller 3006.*

Originally described from Ecuador by Lagerheim on *Rubus* sp. as *Uromyces andinus* (Bull. Soc. Myc. Fr. **11**: 213. 1895) and renamed *U. Lagerheimii* by Magnus (Ber. Deutsch. Bot. Ges. **14**: 377. 1896) because the specific name *andinus* was not tenable. Mayor reported it from Colombia on *Rubus glaucus.* It has also been called *Spirechina Lagerheimii* by Kern & Whetzel (Jour. Dept. Agr. Puerto Rico **14**: 309. 1930).

MILESIA AUSTRALIS Arth. Bull. Torrey Club **5**: 53. 1924.

on *Blechnum fraxineum* Willd. road Caracas to Ocumare del Tuy, March 11, 1939, Est. Miranda, *Whetzel & Müller 2980;* road Maracay to Choroni, Est. Aragua, April 9, 1939, *Chardon, Whetzel & Müller 3376.*

Blechnum occidentale L. road near Los Teques, Est. Miranda, March 9, 1939, *Whetzel & Müller 2935.*

This species is known from Puerto Rico and from Chili, Colombia, and Ecuador in South America. Faull has designated the rust on *B. occidentale* as forma *irregularis.* The uredospores have irregularly scattered spines and minute warts as against evenly spinulose spores on the type host, *B. auriculatum,* from Chili which he calls forma *typica.* (See Faull, Cont. Arnold Arboretum II, pp. 41–46. 1932). Our specimens on the new host *B. fraxineum* appear to be forma *irregularis.*

PHAKOPSORA VIGNAE (Bres.) Arth. Bull. Torrey Club **44**: 509. 1917.

on *Phaseolus lunatus* L. Caracas, Dist. Federal, Jan. 15, 1939, *A. S. Müller 2353.*

Known also from the West Indies, Japan, Java and the Philippine Islands.

PROSPODIUM TUBERCULATUM (Speg.) Arth. N. Am. Flora **7**: 161. 1912.

on *Lantana achyranthifolia* Desf. Tucupe, road beyond El Valle, Caracas, Dist. Federal, March 1, 1939, *Whetzel & Müller 2864.*

Known from the West Indies, Central America, and several South American countries. Cummins in his Monograph on the genus *Prospodium* (Lloydia **3**: 15. 1940) lists several species of *Lantana* but not *L. achyranthifolia.* No other species of *Prospodium* is known to occur on *Lantana.*

PUCCINIA ANCIZARI Mayor, Mem. Soc. Neuch. Sci. Nat. **5**: 525. 1913.

on *Baccharis cassinefolia* DC. Caracas a Colonia Tovar, Dist. Federal, March 19, 1939, *Whetzel, Müller & Tamayo 3072.*

This is an extension of the range from Colombia to Venezuela. Arthur (N. Am. Flora **7**: 476. 1921) uses the name *P. Ancizari* for a Guatemalan rust. Obviously the Guatemalan specimen is not this species; Jackson has supplied the name *P. interjecta* (Mycologia **24**: 148. 1932) for it.

PUCCINIA ARTHURELLA Trotter in Sacc. Syll. Fung. **23**: 694. 1925.

Puccinia proximella Arth., 1925; not *P. proximella* P. & H. Sydow 1912.

on *Lactuca intybacea* Jacq. Antimano, Dist. Federal, Jan. 7, 1940, *Francisco Tamayo 3769.*

This is a uredo stage only. The spores are 18–20 × 21–24 μ which is a close agreement with the size given for *Puccinia Arthurella.* *Puccinia minussensis* Thüm. has slightly larger uredospores,

17–25 × 23–27 μ. The cinnamon-brown color of the sori of our specimen also agrees with *Puccinia Arthurella*. This appears to be the first report of the species outside the West Indies.

PUCCINIA BOMAREAE (Lagerh.) P. Henn. Hedwigia **35**: 342. 1896.
on *Bomarea multiflora* (L.f.) Mirb. forests at Los Venados, above Caracas, Dist. Federal, July 8, 1938, *C. E. Chardon 2695.*

This species was originally described from Ecuador; it is known also from Colombia, Bolivia and Brazil.

PUCCINIA CHAETOCHLOAE Arth. Bull. Torrey Club **34**: 585. 1907.
on *Setaria geniculata* (L.) Scrib. gardens at Las Delicias, near Maracay, Est. Aragua, June 16, 1932, *Chardon, Toro & Alamo 163* (in previous list as *P. substriata*).

This specimen has been studied by Dr. G. B. Cummins and identified as *P. Chaetochloae* in his recent paper on tropical grass rusts (Mycologia **34**: 678. 1942).

PUCCINIA DOLOSA Arth. & Fromme, Torreya **15**: 262. 1915.
on *Paspalum paniculatum* L. vicinity of Merida, *C. E. Chardon 1120* (in original list as *P. tubulosa*) Rio Chico, Est. Miranda, Nov. 2, 1937, *A. S. Müller 2028;* Caracas, Dist. Federal, Dec. 16, 1937, *A. S. Müller 2084;* Tabay, Est. Merida, Nov. 11, 1939, *Barrus & Müller 3629.*

We are indebted to Dr. G. B. Cummins for examining these specimens and for his opinion about *Puccinia dolosa.* This species was established in 1915 by Arthur & Fromme. Later in the N. Am. Flora **7**: 287, 1920, they made it and *Puccinia Puttemansii* P. Henn. synonyms of *Puccinia Huberi* P. Henn. Still later in Proc. Am. Phil. Soc. **54**: 176, 1925, Arthur reached the conclusion that *Puccinia Huberi* and *P. Puttemansii* P. Henn. were to be regarded as synonyms of *Puccinia levis* Magnus. At the same time he listed *P. dolosa* as a synonym of *Puccinia substriata* Ellis & Barth. Dr. Cummins believes that *Puccinia dolosa* is a distinct and valid species. (See Mycologia **34**: 681–682. 1942.) The uredospores are small and have thin brownish walls and echinulate

markings. They are triangular in end view with three pores in the angles. The telia are inconspicuous, covered, and the teliospores are irregular, brittle and apt to be broken in a mount. They are easily overlooked. *P. Huberi* and *P. Puttemansii* have early naked, pulvinate telia. Our specimen No. *2028* has both uredinia and telia; No. *3629* has only uredinia.

PUCCINIA KAERNBACHII (P. Henn.) Arth. Bull. Torrey Club **46**: 110. 1919.
on *Andropogon* sp. Caracas, Dist. Federal, Dec. 28, 1938, *A. S. Müller 2324.*

We have reported two species, *Puccinia meridensis* and *Uredo rubida* from Venezuela on *Andropogon*. *P. Kaernbachii* with its dark colored uredospores and paraphyses is quite different. It has been widely reported from the warmer regions of the world.

PUCCINIA LEPTOCHLOAE Arth. & Fromme, Torreya **15**: 263. 1915.
on *Leptochloa virgata* (L.) Beauv. El Valle, Caracas, Dist. Federal, Dec. 17, 1939, *Barrus & Müller 3739.*

The uredinia are badly parasitized in this specimen; the uredospores are slightly smaller and somewhat thinner-walled than the measurements in the original description. The telia are abundant and fairly typical. This species was described from Paraguay by Dr. Spegazzini under the name *Puccinia subtilipes* (An. Mus. Nac. Hist. Nat. Buenos Aires **31**: 386. 1922) which is to be regarded as a synonym. In North America it occurs in the southern United States, Mexico and the West Indies.

PUCCINIA LYGODII (Har.) Arth. Bull. Torrey Club **51**: 55. 1924.
on *Lygodium venustum* Sw. road Maracay to Guigue, Est. Aragua, April 1, 1939, *Chardon, Whetzel & Müller 3271.*

The type of this species was collected at Pernambuco, Brazil. Faull has a full account of the species under "Excluded species" in his Monograph of the genus *Milesia* (Cont. Arnold Arboretum II, pp. 121–122. 1932). He knew of six collections—three from Brazil, one each from Trinidad, El Salvador, and British Guiana. Arthur proposed the combination *Puccinia Lygodii* on the strength of stalked septate teliospores which he reports finding on a Bra-

zilian specimen collected by Rose & Russell (No. *21514*). We have had the opportunity of examining these teliospores through the kindness of Dr. G. B. Cummins, and see no reason for not accepting Dr. Arthur's reference of the species to the genus *Puccinia*. Sydow described a new species, *Milesina Lygodii* on *Lygodium* sp. from British Guiana (Mycologia **17**: 255. 1925). He did not find any teliospores and there is no reason for believing it belongs to the genus *Milesia;* the uredo is in all respects like all the other specimens known on *Lygodium*.

PUCCINIA MACRA Arth. & Holw.; Arth. Am. Jour. Bot. **5**: 465. 1918.

on *Paspalum candidum* (Humb. & Bonpl.) Kunth. LaVenta, Est. Merida, Nov. 11, 1939, *Barrus & Müller 3625*.

This species was described from Guatemala. It has since been reported from Costa Rica, Bolivia, Colombia. Arthur recorded it also from Ecuador, but according to Cummins, that was an error (see Mycologia **34**: 687–688. 1942). Our specimen (*Barrus & Müller 3625*) has been reported from Venezuela by Cummins (l.c.); the species, *Puccinia macra,* is nevertheless an addition to the Venezuelan lists of Uredinales cited in the first paragraph of this paper.

PUCCINIA RUELLIAE (Berk. & Br.) Lagerh. Tromsö Mus. Aarsh. **17**: 71. 1895.

on *Blechum Brownei* (Sw.) Juss. Guarenas, Est. Miranda, March 18, 1938, *A. S. Müller 2130;* road Maracay to Guigue, Est. Aragua, April 5, 1939, *Chardon, Whetzel & Müller 3324;* Barcelona, Est. Anzoategui, Feb. 1, 1940, *M. F. Barrus 3805*.

Ruellia tuberosa L. road near San Mateo, Est. Aragua, March 9, 1939, *Whetzel & Müller 2938;* road Maracay to Guigue, Est. Aragua, March 31, 1939, *Chardon, Whetzel & Müller 3253*.

Arthur in the N. Am. Flora (vol. **7**, p. 415, 1921) includes the rust on *Blechum* under *P. Ruelliae*. In reporting the rusts of Colombia we followed Arthur. Jackson in his studies of South American rusts (Mycologia **24**: 95. 1932) prefers to use the name *Puccinia Blechi* Lagerh. for the rust on *Blechum*.

PUCCINIA SUBCORONATA P. Henn. Hedwigia **34**: 94. 1895.
on *Cyperus* aff. *alternifolius* L. Dominguez farm, Chacao, Dist. Federal, April 28, 1934, *Kern & Toro 1719.*

This rust is known also from Colombia, Trinidad, British Guiana, Costa Rica, Honduras and Panama.

RAVENELIA PITHECOLOBII Arth. Bot. Gaz. **39**: 394. 1905.
on *Pithecolobium dulce* (Roxb.) Benth. Guatire, Est. Miranda, March 18, 1938, *A. S. Müller 2132.*

Known also from Florida, Cuba, Puerto Rico and Mexico.

SCOPELLA SAPOTAE (Arth. & Johnston) Mains, Ann. Myc. **37**: 59. 1939.
Uredo Sapotae Arth. & Johnston, Mem. Torrey Club **17**: 169. 1918.
on *Achras Sapota* L. (*Sapota Achras* Mill.), Caracas, Dist. Federal, Dec. 28, 1938, *A. S. Müller 2337;* Los Chorros, Caracas, Dist. Federal, Feb. 22, 1939, *Whetzel & Müller 2812.*

This appears to be the second report outside the islands Bermuda, Cuba, Bahamas, and Santo Domingo. Mains has reported it from British Honduras, Central America. For information about the genus *Scopella* see Mains, Ann. Myc. **37**: 59. 1939.

UREDO BORRERIAE (P. Henn.) Kern & Whet. Mycologia **18**: 42. 1926.
on *Borreria verticillata* (L.) G. F. W. Mey. Petare, Est. Miranda, May 14, 1937, *A. S. Mülleri 1848.*

The type locality is in Brazil. It is reported also from Puerto Rico.

UREDO INGAE P. Henn. Hedwigia Beibl. **38**: 69. 1899.
on *Inga fastuosa* Willd. La Cortada, San Antonio de los Altos, Est. Miranda, April 3, 1938, *Chardon & Tate 2613.*

This uredinial stage has spores with echinulate markings. The best name for it seems to be *Uredo Ingae.* For further notes on Inga rusts see Mycologia **32**: 622–623, 1940.

Uredo Lycoseridis sp. nov.

Uredosoris epiphyllis, in gregibus 2–4 mm. diam., in maculis flavis insidentibus, minutis, rotundatis vel ovatis, 0.3–0.6 mm. diam., tarde nudis, obscure castaneo-brunneis, epidermide rupta visibile; uredosporis late ellipsoideis vel obovoideis, 26–31 × 34–42 μ; tunica obscure cinnamomeo-brunnea, 1.5–2 μ cr., crassissimis sparse echinulata, spinis ad 3 μ longis; poris 2, aequatorialibus.

on *Lycoseris oblongifolia* Rusby, Las Trincheras, Est. Carabobo, Feb. 24, 1940, *Barrus & Müller 3857* (type); Hacienda Lucinda, Urama, Est. Carabobo, April 3, 1939, *Chardon, Whetzel & Müller 3297*.

We do not find that any rust has been described on this host and no similar rust is known on a closely related host. The species is characterized by the large spores which are unusually coarsely echinulate. In sections there is evident a growth of stromatic tissue about the sori, but we fail to make out any definite peridial development.

UROMYCES ASCLEPIADIS (Schw.) Cooke, Grevillea **5**: 152. 1877.
on *Asclepias curassavica* L., banks of Neveri, near Barcelona, Est. Anzoategui, May 26, 1938, *C. E. Chardon 2680*.

A common rust in North America; in South America known from Colombia, Brazil, and Peru.

UROMYCES CARYOPHYLLINUS (Schr.) Wint. in Rab. Krypt.-Fl. **1**[1]: 149. 1881.
on *Dianthus caryophyllus* L. Merida, Est. Merida, April 8, 1939, *J. Camero-Tamara 3074*.

This rust is world-wide in its distribution, apparently occurring in every state and country where carnations are grown. Arthur, in his Manual of the Rusts of U. S. and Canada, records it from South America. We do not know from what countries there it has been reported.

UROMYCES CESTRI (Mont.) Lév. Ann. Sci. Nat. III. **8**: 371. 1847.
on *Cestrum latifolium* Lam. Rancho Grande, road Maracay to Ocumare de la Costa, Est. Aragua, March 29, 1939, *Whetzel & Müller 3204*.

This species is widely distributed in South America, Central America, and the West Indies.

UROMYCES FLECTENS Lagerh. Sv. Bot. Tidskr. **3**: 36. 1909.
on *Trifolium repens* L. Paramo Zumbador, Est. Tachira, Nov. 14, 1939, *Barrus & Müller 3590;* Bailadores, Est. Merida, Nov. 13, 1939, *Barrus & Müller 3595.*

Only teliospores are present. Jackson has included specimens from Chile, Bolivia, and Ecuador under this species (Mycologia **23**: 353. 1931). It is known also from Europe and Asia.

UROMYCES INDIGOFERAE Diet. & Holw.; Holway, Bot. Gaz. **31**: 328. 1901.
on *Indigofera mucronata* Spreng. Caracas, Dist. Federal, Aug. 29, 1938, *A. S. Müller 2257.*

We have found no report of this species from South America; it is known from Texas, Mexico, and Central America.

UROMYCES MEGALOSPERMUS Speg. Anal. Mus. Buenos Aires 218. 1899.
on *Tessaria integrifolia* Ruiz & Pav. Chirgua, Est. Carabobo, Dec. 15, 1939, *M. F. Barrus 3737.*

Originally described from Argentina; known also from Colombia and Peru.

UROMYCES NEUROCARPI Diet. Hedwigia **34**: 292. 1895.
on *Clitoria rubiginosa* Juss. (*Martiusia rubiginosa* Britton), Sebastopol, Los Teques, Est. Miranda, Sept. 11, 1938, *V. Badillo 2302.*
Clitoria guianensis (Aubl.) Benth. Soledad, Est. Anzoategui, Sept. 30, 1939, *A. S. Müller 3485.*

Type locality Brazil; known also from Puerto Rico, Jamaica, Cuba, Trinidad, El Salvador, Ecuador, and Colombia.

UROMYCES SCLERIAE P. Henn. Hedwigia Beibl. **38**: 67. 1899.
on *Scleria macrophylla* Presl. road to Chirgua, Est. Carabobo, March 8, 1939, *Whetzel & Müller 2953.*

Originally from Brazil; in South America known also from British Guiana and Trinidad; in North America from Cuba, Puerto Rico, and Santo Domingo.

Uromyces Tripsaci sp. nov.

Uredosoris et uredosporis incognitis.

Teleutosoris epiphyllis, gregariis, in maculis decoloratis insidentibus, intercostalibus, oblongis vel linearibus, epidermide diu tectis, tandem rimose dehiscentibus, castaneo-brunneis; teliosporis oblongis vel anguste ellipsoideis, 19–26 × 42–66 μ; tunica aurato- vel pallide cinnamomeo-brunnea, supra pallidiore, 1.5–2 μ cr., apice ad 7–10 μ incrassata, levi; poro unico prope basim praeditis; pedicello brevissimo, deciduo.

on *Tripsacum dactyloides* L. Valera, Est. Trujillo, Nov. 11, 1939, *Barrus & Müller 3624*.

This is an unusual rust in several respects. The telia are long covered by the epidermis but finally become exposed by longitudinal slits. The teliospores are pedicellate but the pedicels break away close to the spore. Even in sections the spores appear detached. There is a single pore which is located near the hilum. No uredo stage is present; we have not even found stray uredospores among the teliospores. Not only is there nothing on *Tripsacum* like it—we do not know any grass rust which is similar.

DEPARTMENT OF BOTANY,
THE PENNSYLVANIA STATE COLLEGE

UREDINALES FROM THE NORTHWEST HIMALAYA [1]

GEORGE B. CUMMINS

(WITH 7 FIGURES)

The rusts reported in this paper were collected by Dr. R. R. Stewart or by R. R. and I. D. Stewart in the northern part of the United Provinces and in the Punjab, Kashmir and the Northwest Frontier Province of India. For an account of an early collection by Stewart from this region see Arthur and Cummins (Mycologia **25**: 397–406. 1933). Species marked with an asterisk represent new records for India.

Specimens, including types, are in the Arthur Herbarium, Purdue University Agricultural Experiment Station, the Gordon College Herbarium, Rawalpindi, India and the Herbarium of the New York Botanical Garden. The collection was made available for study through the courtesy of Dr. R. R. Stewart and Dr. Fred J. Seaver.

AECIDIUM CALLIANTHUM Sydow, *Desmodium tiliaefolium* G. Don, Uri-Aliabad, Jhelum Valley, July 1934, *13952*.

AECIDIUM CRYPTICUM Kalchbr. & Cooke, *Gerbera lanuginosa* Benth., Landour, Aug. 8, 1934, *14215*, Aug. 11, 14, 1937, *15976, 16037*, Aug. 5, 1938, *16656A, 16695*.

AECIDIUM FLAVESCENS Barclay, *Senecio rufinervis* DC., Landour, Aug. 12, 1937, *15996*.

AECIDIUM GIRARDINIAE Sydow, *Girardinia heterophylla* Dene., Landour, July 22, 31, 1937, *15899, 15958*.

AECIDIUM HEDERAE Wakef., *Hedera Helix* L., Murree, June, July 1935, *14745A*.

This species was published by Arthur and Cummins (Mycologia **25**: 398. 1933) as a new species, *Aecidium Hederae*, but this was antedated by Miss Wakefield's publication (Bull. Misc. Inform. Kew **1931**: 202. 1931). Miss Wakefield kindly sent me a por-

[1] Journal Paper Number 84, of the Purdue University Agricultural Experiment Station. Contribution from the Department of Botany.

tion of the type specimen for comparison and the rusts are clearly identical.

AECIDIUM MONTANUM Butler, *Berberis ceratophylla* G. Don, Murree, June 29–30, 1934, *13893,* June 1935, *15354; Berberis petiolaris* Wall., Murree, June 1935, *14740A, 14752A,* May 28, 1937, *15889A; Berberis Zabeliana* C. K. Schum., Rattu, Gilgit Road, Aug. 21, 1939, *18839,* above Chorwan, Gilgit Road, July 25, 1940, *19732.*

***Aecidium plectranthicola** sp. nov.

Pycniis epiphyllis in maculis flavidis vel brunneis usque ad 6 mm. diam., subepidermalibus, globoideis, 75–100 μ diam., paraphysatis. Aeciis hypophyllis, aggregatis, cupulatis, 150–200 μ diam.; cellulis peridii ellipsoideis vel oblongis, 18–23 × 27–33 μ, pariete interiore moderate verrucoso 2.5–3 μ cr., exteriore striato 3–5 μ cr.; aeciosporae globoideae, ellipsoideae vel oblongo-ellipsoideae, 15–23 × 23–29 μ; membrana hyalina, 1–1.5 μ cr., ad apicem usque ad 8 μ cr., verrucosa.

On *Plectranthus coetsa* Buch.-Ham., Landour, July 22, 1937, *15905,* July 24, 1937, *R. R. Stewart 15919* (type).

A. plectranthicola is clearly distinct from *A. Plectranthi* Barclay, which occurs on the same host, because of the strongly thickened apical walls of the aeciospores.

AECIDIUM RANUNCULACEARUM DC., *Ranunculus hirtellus* Royle, Deosai Plains toward Skardu, July 28, 1940, *19966.*

*AECIDIUM SAUSSUREAE Johans.?, *Saussurea Candolleana* Wall., above Chorwan, July 25, 1940, *19684.*

AECIDIUM SCUTELLARIAE Sydow, *Scutellaria angulosa* Benth., Landour, July 27, 31, 1937, *15936, 15944, 15954.*

***Aecidium Stewartianum** sp. nov.

Pycniis epiphyllis, in maculis brunneis usque ad 5 mm. diam., subepidermalibus, paraphysatis. Aeciis hypophyllis, aggregatis, cupulatis, 0.2–0.3 mm. diam., flavidis; cellulis peridii oblongis, ellipsoideis vel polyhedricis, 16–25 × 24–32 μ, flavidis, pariete exteriore moderate verrucoso 2–2.5 μ cr., interiore striato 3–4 μ cr.; aeciosporae globoideae, ellipsoideae vel oblongo-ellipsoideae, 15–19 × 19–26 μ; membrana hyalina, minuteque verrucosa, 1–2 μ cr., ad apicem usque ad 13 μ cr.

On *Heracleum candicans* Wall., near Taubat, Kishenganga Valley, Kashmir, July 25–26, 1939, *R.R. & I.D. Stewart 17913* (type).

The apically thickened walls of the aeciospores distinguish *A. Stewartianum* from other aecial forms on *Heracleum.*

AECIDIUM TANDONII Mitter, *Deutzia staminea* R. Br., Camel's Back Road, Mussoorie, Aug. 18, 1934, *14351,* Sept. 29, 1937, *16055;* Landour, Aug. 30, 1934, *14493,* Sept. 4, 1936, *15718;* to Benog from Mussoorie, Aug. 30, 1937, *16095A.*

COLEOSPORIUM INULAE (Kunze) Rabenh., *Inula nervosa* Wall., Landour near Mussoorie, Aug. 15, 1936, *15556A.*

COLEOSPORIUM LEPTODERMIDIS (Barclay) Sydow, *Leptodermis lanceolata* Wall., Landour, Aug. 25, 1936, *15613A,* Aug. 19, 1937, *16053.*

COLEOSPORIUM PLECTRANTHI Barclay, *Plectranthus strictus* Benth., Landour, Aug. 25, 1934, *14458; Plectranthus* sp., Mussoorie, Aug. 11, 1937, *15968.*

*ENDOPHYLLUM TUBERCULATUM (Ellis & Kellerm.) Arth. & Fromme, *Lavatera kashmiriana* Camb., below Minimarg, Kishenganga Valley, August 1939, *19230A.*

This species has not been reported previously as occurring outside of the plains area of the western United States where it parasitizes *Althaea, Callirhoë* and *Sidalcea.* Stewart's specimen agrees in all respects with the American material and there appears to be no reason to doubt its identity.

*GYMNOSPORANGIUM CLAVARIAEFORME (Jacq.) DC., *Cotoneaster integerrima* Medik., above Rattu, Gilgit Road, Aug. 21, 1939, *18846,* Godai to Chillam, Gilgit Road, Aug. 25, 1939, *18964; Cotoneaster nummularia* F. & M., Chorwan, Aug. 16, 1939, *18607,* July 24, 1940, *19667;* Rattu above Astor Valley, Aug. 19–20, 21, 1939, *18781, 18825;* Rupal Nullah, Nanga Parbat, Aug. 22, 1939, *18887.*

Both leaves and fruits are infected in these collections. The aeciospores and peridial cells agree with those of *G. clavariaeforme.* Tranzschel (Conspectus Uredinalium URSS, p. 216. 1939) records only *G. fusisporum* Ed. Fischer on these two hosts but the peridial cells in the Indian collections are verrucose as in *G. clavariaeforme* and not ridged as described and figured by Fischer (Mitt. Nat. Ges. Bern **1917**: 73. 1918) for *G. fusisporum.*

Stewart notes that the host of No. 19667 was "growing under *Juniperus macropoda*" and the collection of galls (No. 19666) from the juniper bears the notation "Adjacent plants of *Cotoneaster* were rusted." The galls bear old telial scars which appear

not to have been caused by *G. clavariaeforme*. For further comments see *G. confusum*.

*GYMNOSPORANGIUM CONFUSUM Plowr., *Crataegus oxyacantha* L., Rupal Nullah, Aug. 22, 1939, *18880;* Badwan, Kishenganga Valley, July 21, 1940, *19596; Pyrus lanata* Don, Chorwan, Aug. 10, 1939, *18600; Juniperus macropoda* Boiss., Chorwan, July 24, 1940, *19666*.

While the aecial collections appear unquestionably to be *G. confusum* the telial collection is less certain. The galls are fusiform and bear old telial scars which appear like those of *G. confusum*. A few old teliospores were found which agreed fairly well with the thinner-walled type of *G. confusum* and were too small and regular in shape to suggest *G. fusisporum*. A notation on the packet is as follows: "Adjacent plants of *Cotoneaster* were rusted." The concerned aecial collection (No. 19667) is listed under *G. clavariaeforme*. Such close association is highly suggestive but not conclusive since aecia of *G. confusum* were also collected (No. 18600) at Chorwan the previous year. In any case the telial scars do not suggest *G. clavariaeforme*. Identity of these Indian *Gymnosporangia* can be decided definitely only when cultures have been made to determine the alternate hosts.

GYMNOSPORANGIUM CUNNINGHAMIANUM Barclay, *Cotoneaster bacillaris* Wall., Landour, Aug. 16, 1934, Aug. 15, 1936, *14388, 15565; Pyrus pashia* Buch.-Ham., Landour, July 27, 1935, *14854A*, July 1936, *15541, 15552*, July 24, 31, 1937, *15921, 15950*.

GYMNOSPORANGIUM DISTORTUM Arth. & Cumm., *Cotoneaster bacillaris* Wall., Rajdhiangan Pass, Gilgit Road, July 19, 1940, *19528*.

This species was originally described (*l.c.*, p. 400) from fragmentary material but the present collection is abundant and in fine condition. The aecia are horn-shaped, 0.5–1 mm. in diameter at the base and 3–4 mm. in length, and occur on somewhat hypertrophied and distorted twigs (FIG. 1). For illustrations of the aeciospores and peridial cells see the original publication.

According to Crowell (Can. Jour. Res. C., **18**: 479. 1940) *G. distortum* also occurs in western China.

MELAMPSORA AECIDIOIDES (DC.) Schroet., *Populus alba* L., Abbottabad, Hazara, April 1935, *14635*.

*MELAMPSORA LARICI-EPITEA Kleb., *Salix hastata* L., below Kun Patthar, Aug. 14, 1939, *18528;* Burzil Chowki, Gilgit Road, July 26, 1940, *19771; Salix oxycarpa* Anders.?, Godai above Gurikot, Aug. 24, 1939, *18942.*

M. Larici-capraearum Kleb. is the only *Salix* rust listed by Butler and Bisby (Fungi of India, p. 60. 1931) and they point out that there are probably two or more species of *Melampsora* involved and that perhaps none of them is *M. Larici-capraearum.* Stewart's collections quite certainly are not that species since the teliospores (present in No. 18942) are not thickened apically.

Insofar as the morphology of the paraphyses, urediospores and teliospores is concerned the Stewart specimens show complete agreement with *M. Larici-epitea.* I was not able, however, definitely to determine the position of the telia with respect to the epidermis but believe them to be either subcuticular or intraepidermal in origin.

MONOSPORIDIUM ANDRACHNIS Barclay, *Andrachne cordifolia* Muell., Jabberkhet near Landour, Aug. 1, 1934, *14181,* Landour, August 1935, *14868A,* July 22, Aug. 14, 1936, *15541A, 15555.*

PHRAGMIDIUM BUTLERI Sydow, *Rosa macrophylla* Lindl., near Waziri Thal, Tilel Dist., Aug. 14, 1939, *18514A.*

PHRAGMIDIUM POTENTILLAE (Pers.) Karst., *Potentilla argentea* L., Gurikot, Astor Valley, Aug. 23, 1939, *18917.*

PHRAGMIDIUM ROSAE-MOSCHATAE Dietel, *Rosa moschata* J. Hermm., Murree, June 1935, *14751A; Rosa Webbiana* Wall., Satpura Nullah above Skardu, Aug. 3, 1940, *20349;* beyond Dras, Ladak Road, Aug. 28, 1940, *21124.*

*PUCCINIA ACROPHILA Peck, *Lagotis glauca* Gaertn., Deosai Plains on Skardu Road, July 30, 1940, *20071.*

P. acrophila occurs on *Besseya* and *Synthris* in the Rocky Mountains from Colorado to Montana and has been considered to be strictly an American species. Moreover, the usual rust on *Lagotis* is *Puccinia Gymnandrae* Tranz., a species of Asiatic distribution but recently found also in Alaska. The two species are generally similar but *P. acrophila* has shorter and broader teliospores than does *P. Gymnandrae.* Stewart's specimen agrees in all respects with *P. acrophila.*

PUCCINIA AINSLIAEAE Sydow, *Ainsliaea pteropoda* DC., Landour, Sept. 3, 1936, *15652,* July 31, 1937, *15952;* Cloud End, Aug. 30, 1937, *16097.*

*PUCCINIA BEHENIS (DC.) Otth, *Lychnis inflata* Wall., Shankargarh, Upper Astor Valley, Aug. 18, 1939, *18754; Silene latifolia*

FIG. 1, accia of *Gymnosporangium distortum* Arth. & Cumm. on *Cotoneaster bacillaris* (from Stewart *19528*) × 1; 2, urediospores and one teliospore of *Puccinia heracleicola* Cumm. on *Heracleum Thomsoni* var. *glabrior* (from type) × 800; 3, teliospores of *Puccinia Holboelliae-latifoliae* Cumm. on *Holboellia latifolia* (from type) × 800; 4, teliospores of *Puccinia Prostii* Moug. on *Tulipa stellata* (from Stewart *13677*) × 800.

(Mill.) Britt. & Rendle (*S. inflata* Sm.), Upper Astor Valley, Aug. 19–20, 1939, *18743A*.

*PUCCINIA RIBESII-CARICIS Kleb., *Ribes nigrum* L., Chillam, Gilgit Road, Aug. 25, 1939, *18953*.

PUCCINIA CIRCAEAE Pers., *Circaea alpina* L., Jabberkhet, Aug. 24, 1935, *14970;* Badwan below Gurez, Aug. 30, 1939, *19236A, 19238*.

PUCCINIA CORONATA Corda, *Berchemia lineata* DC., above Uri, Sind Valley, July 1934, *13921; Rhamnus pentapomica* Parker, Bataki, lower Kishenganga Valley, July 8, 1939, *17336; Rhamnus virgata* Roxb., Changla Gali, Murree Hills, July 1934, *14009;* Landour, Aug. 8, 1934, *14265*.

*PUCCINIA DRABAE Rud., *Draba altaica* Bunge, Zojibal Pass, Aug. 10, 1939, *18024*.

PUCCINIA EXTENSICOLA Plowr., *Solidago virga-aurea* L., Keran, July 7, 1939, *17566*.

PUCCINIA GENTIANAE (Str.) Link, *Gentiana thianshanica* Rupr., Chillam beyond Burzil, Aug. 25, 1939, *18974;* Chillam, Gilgit Road, Aug. 26, 1939, *18969*.

PUCCINIA GRAMINIS Pers., *Berberis asiatica* Roxb., Landour, Aug. 9, 1934, *14271,* summer, 1936, *15617A,* Aug. 20, 1937, *16052; Berberis ceratophylla* Don, Jhelum Valley, July 1934, *14008;* Dhanni-Titwal, July 9, 1939, *17403*.

PUCCINIA HERACLEI Grev., *Heracleum candicans* Wall., Minimarg, Aug. 29, 1939, *19176*.

***Puccinia heracleicola** sp. nov (FIG. 2.)

Uredia caulicola et inflorescenticola, distortiones efficientia, in lineas usque ad 1.5 cm. confluentibus, epidermide rupta conspicue, cinnamomeo-brunnea, pulverulenta; urediosporae ovoideae, oblongo-ellipsoideae vel oblongae, 18–25 × 32–46 (–49) μ; membrana plus minusve bilaminata, 2–3 μ cr., ad basim 3–5 μ cr., ad apicem 5–8 μ cr., aureo- vel pallide cinnamomeo-brunnea, pariete exteriore subhyalino, moderate echinulata; poris germ. 3, aequatorialibus. Telia caulicola, rotundata vel oblonga, 0.3–1.5 mm. longa, pulverulenta, castaneo-brunnea; teliosporae ellipsoideae utrinque rotundatae, medio leniter constrictae, 21–25 × 30–40 μ; membrana castaneo-brunnea, moderate verrucosa, 2.5–3 μ cr. vel ad apicem 3–4 μ cr.; poro superiore apicali, inferiore juxta septum sito; pedicello hyalino, sporam aequante sed fragili et deciduo.

On *Heracleum Thomsoni* var. *glabrior* C. B. Clarke, ascent Lohan Gali, near Tilel, Kashmir, Aug. 14, 1939, *R. R. & I. D. Stewart 18495* (type).

This species, characterized by the large, apically thickened urediospores, has the appearance of a brachy-form but pycnia were not found in sections. The uredia occur most commonly at the base of the umbels, where the infection causes distortion of varying severity, or less commonly singly on the stems. Frequently, the flowers and fruits are also infected.

The pores of the teliospores occur in slightly thickened areas of the wall but are not covered by a differentiated papilla or umbo. Mesospores are rare.

PUCCINIA HETEROSPORA Berk. & Curt., *Sida veronicaefolia* Lam., Jabberkhet, Aug. 25, 1937, *16073;* Kalanga Hill, Rajpur, Sept. 7, 1937, *16141.*

PUCCINIA HIERACII (Schum.) Mart., *Hieracium vulgatum* Koch, Chorwan to Burzil Chowki, July 26, 1940, *19808;* Zoji Pass, Ladak Road, Aug. 30, 1940, *21246.*

***Puccinia Holboelliae-latifoliae** sp. nov. (FIG. 3.)

Teliis hypophyllis, in maculis brunneis 1–2 mm. diam. laxe aggregatis, rotundatis, 0.1–0.2 mm. diam., pulvinatis, brunneis; teliosporae cylindraceae, ad apicem rotundatae vel leniter attenuatae, ad basim leniter attenuatae, medio vix constrictae, 9–15 × 38–57 μ; membrana 1–1.5 μ cr. vel ad apicem 1.5–3 μ cr., aurea vel pallide cinnamomea, levi; pedicello persistenti, hyalino, sporam aequante.

On *Holboellia latifolia* Wall., Camel's Back, Mussoorie, Sept. 24, 1937, *R. R. Stewart 16058* (type).

This microcyclic species is characterized by the formation of relatively few, small telia in dark brown spots and by its long, narrow spores. No previously described rust on Berberidaceae is similar.

PUCCINIA IRIDIS (DC.) Wallr., *Iris kashmiriana* Baker, Kashmir Valley, July 1934, *14051.*

PUCCINIA LEVEILLEI Mont., *Geranium collinum* Steph., Satpura Nullah, Baltistan, Aug. 2, 1940, *20230; Geranium pratense* L., ascent Lohan Gali, Aug. 14, 1939, *18485, 18485A; Geranium rectum* Trautv., Kun Patthar, Aug. 14, 1939, *18255A; Geranium* sp., Kun Patthar to Waziri Thal, Aug. 14, 1939, *18515A.*

*PUCCINIA LIBANI P. Magn., *Prangos pabularia* Lindl., Lohan Gali near Purana Tilel, Aug. 14, 1939, *18498.*

*PUCCINIA LIGUSTICI Ellis & Ev., *Selinum papyraceum* C. B. Clarke, Burzil Chowki, Gilgit Road, July 27, 1940.

This microcylic species occurs in North America on species of *Angelica, Carum, Cogswellia, Coneoselinum, Ligusticum, Oxypolis* and *Sanicula.* Stewart's collection agrees in all respects with American material.

*PUCCINIA LONGIROSTRIS Kom. (FIG. 7), *Lonicera asperifolia* H. & T., Satpura Valley above Skardu, Baltistan, Aug. 3, 1940, *20310.*

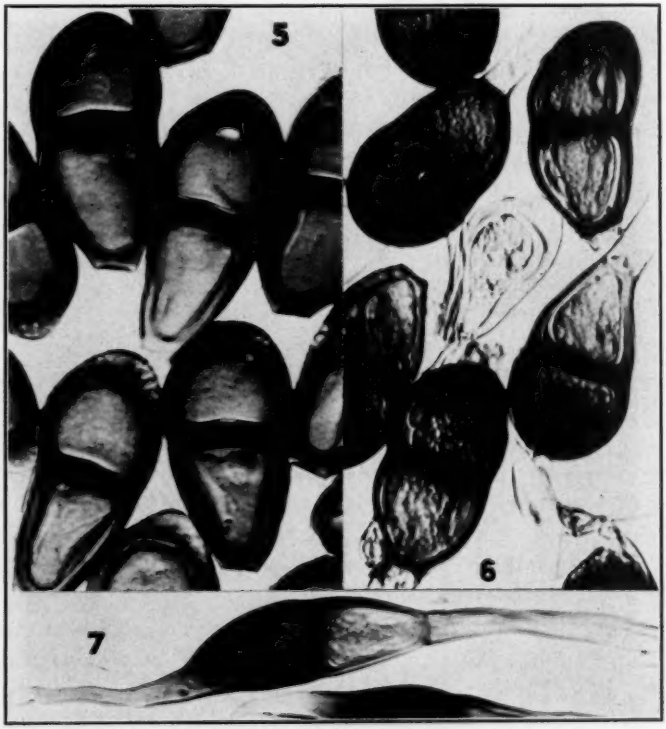


FIG. 5, teliospores of *Puccinia pulvinata* Rab. on *Echinops niveus* (from Stewart *15786A*); 6, teliospores of *Puccinia* sp. on *Iris Aitchisoni* (from Stewart *15838A*); 7, one teliospore of *Puccinia longirostris* Kom. on *Lonicera asperifolia* (from Stewart *20310*); × 800.

*PUCCINIA MELASMIOIDES Tranz., *Aquilegia vulgaris* L. var. *alpina* H. & T., below Kun Patthar, Aug. 14, 1939, *18488, 18517;* Chillam below Burzil Pass, Aug. 25, 1939, *18971.*

PUCCINIA MENTHAE Pers., *Mentha sylvestris* L., Titwal to Surkhala, Kishenganga Valley, July 12, 1939, *17437.*

PUCCINIA MONTICOLA Kom., *Polygonum alpinum* All., Chillam, Burzil Pass, Gilgit Road, Aug. 25, 1939, *18984;* Godai to Chillam, Aug. 25, 1939, *19139.*

PUCCINIA NITIDA Barclay, *Polygonum polystachyum* Wall., Banihal Pass, Oct. 5, 1934, *14150B.*

*PUCCINIA PLICATA Kom., *Prangos pabularia* Lindl., Lohan Gali near Purana Tilel, Aug. 14, 1939, *18498 bis.;* above Minimarg, Gilgit Road, July 26, 1940, *19798.*

PUCCINIA POLLINIAE Barclay, *Strobilanthes Dalhousianus* C. B. Clarke, Landour, Aug. 6, 1934, *14247,* Aug. 5, 1935, *14867,* July 21, 31, 1937, *15907, 15962.*

PUCCINIA POLYGONI-AMPHIBII Pers., *Geranium rectum* Trautv., Tilel Valley to Chorwan, Aug. 16, 1939, *18597; Geranium Wallichianum* Sw., Jabberkhet, Landour, July 22, 1937, *15898,* July 1938, *16886A.*

PUCCINIA PRAECOX Bubák, *Crepis oligocephala* Sch.-Bip., Banihal Pass, Oct. 4–5, 1934, *14151B.*

PUCCINIA PRAINIANA Barclay, *Smilax aspera* L., below Landour, Aug. 23, 1934, *14405.*

PUCCINIA PRENANTHES-PURPUREAE (DC.) Lindr., *Lactuca decipiens* C. B. Clarke, above Chorwan, July 25, 1940, *19729;* Chorwan to Burzil Chowki, July 26, 1940, *19763.*

PUCCINIA PROSTII Moug., *Tulipa stellata* Hook., Abbottabad, April, 1934, *13677;* Margalla, Rawalpindi Distr., Mar. 29, 1936, *15390A.*

The teliospores (FIG. 4) in Stewart's material are more strongly spinulose than in material which I had for comparison (Thümen, Myc. Univ. *437;* Rab. Fungi Eur. *2165*) but agree with the rust as reported and figured by Nattrass (A first list of Cyprus fungi. 87 pp. Nicosia. 1937).

PUCCINIA PULVINATA Rab. *Echinops niveus* Wall., Landour, Dec. 1, 1936, *15786A.*

Accounts in the literature indicate that this is a rather variable species. In Stewart's collection the urediospores are somewhat smaller and thinner-walled than given in most descriptions. Moreover, the teliospores (FIG. 5) are narrower, the wall is distinctly verrucose and the apex is noticeably umbonate. The gross appearance of the telia is typical.

PUCCINIA RUBIGO-VERA (DC.) Wint., *Aconitum rotundifolium* Kar. & Kir., Deosai Plains, July 30, 1940, *s. n.; Actaea spicata* L., Kamri Pass, Aug. 17, 1939, *18648; Anemone tetrasepala* Royle, Rajdhiangan Pass, Gilgit Road, July 19, 1940, *19481; Aquilegia vulgaris* L., subsp. *pubiflora* H. & T., Keran, July 14, 1939, *17618; Aquilegia vulgaris* L. (var.), Burzil Chowki, Gilgit Road, July 27, 1940, *19883; Clematis orientalis* L., Gurikot, Astor Valley, August 1939, *18925; Thalictrum minus* L., var. *majus* H. & T., Khel-Taubat, July 24–25, 1939, *17843.*

PUCCINIA SAXIFRAGAE-CILIATAE Barclay, *Saxifraga ciliata* Royle, above Uri, Jhelum Valley, July 1, 1934, *13923; Saxifraga Stracheyi* H. & T., Thalle La, Baltistan, Aug. 13, 1940, *20599.*

PUCCINIA SWERTIAE Wint., *Swertia petiolata* Royle, above Gulmarg, July 1934, *14033; Swertia speciosa* Wall., above Chorwan, July 25, 1940, *19723; Swertia Thomsoni* C. B. Clarke, Gadsar, Aug. 11, 1939, *18333;* Chillam, Gilgit Road, Aug. 25, 1939, *18890, 18990; Swertia* sp., Pir Panjal Range, July 1934, *13977A.*

PUCCINIA TARAXACI Plowr., *Taraxacum officinale* Wigg., Burzil Chowki, July 28, 1940, *19878, 19975.*

PUCCINIA VIOLAE (Schum.) DC., *Viola biflora* L., Rajdhiangan Pass, Gilgit Road, July 19, 1940, *19509.*

PUCCINIA WATTIANA Barclay, *Clematis grata* Wall., Naranag, Wangat Valley, Aug. 8, 1939, *18122; Clematis* sp., Jabberkhet, Landour, Aug. 16, 1934, *14362;* Dehra Dun, Sept. 1934, *14673.*

*PUCCINIA sp., *Iris Aitchisoni* Boiss., Margalla Pass near Rawalpindi, Mar. 29, 1937, *15838A.*

This collection probably represents an undescribed species but the specimen is so scanty that I prefer not to attach a specific name.

The two groups of sori are caulicolous with the pulvinate, blackish brown telia occurring in a more or less concentric ring around the remnants of the preceding aecial cups. The telia are early ex-

posed and devoid of paraphyses; the teliospores (FIG. 6) mostly clavate or oblong-ellipsoid, 18–27 × (30–) 38–49 μ; the smooth wall is chestnut-brown, 2–3 μ thick at the sides and (3–) 4–7 μ at the apex; the pedicel is persistent, pale yellowish and about as long as the spore. No aecia in condition for adequate description are present but the peridial cells are variable, globoid, ellipsoid or oblong, 18–23 × 26–38 μ, the inner wall verrucose and 1.5–2 μ thick, the outer wall striate and 4–6 μ thick. The aeciospores are hyaline, finely verrucose, ellipsoid to globoid, 14–19 × 18–23 μ and with a wall 1–1.5 μ in thickness. A few irregular and usually somewhat angular urediospores (17–22 × 22–26 μ) were seen, the wall golden-brown, apparently finely verrucose, 2.5–3 μ thick and with three or four pores, variously placed.

*TRACHYSPORA ALCHEMILLAE (Pers.) Fuckel, *Alchemilla vulgaris* L., Deosai Plains between Burzil Chowki and Skardu, July 29, 1940, *20049*.

UROMYCES GERANII (DC.) Fries, *Geranium aconitifolium* L' Her.?, above Chorwan, Gilgit Road, July 25, 1940, *19687; Geranium* probably *grandiflorum* Edgew., Kamri Pass, Aug. 17, 1939, *18646*.

**Uromyces Haussknechtii* Tranz., *Euphorbia pilosa* L., above Gadsar, Aug. 12, 1939, *18346*.

UROMYCES HEDYSARI-OBSCURI (DC.) Car. & Picc., *Hedysarum cachemirianum* Benth., Kamri Pass, Aug. 18, 1939, *18689*.

*UROMYCES KONDOI M. Miura?, *Gueldenstaedtia* probably n. sp. near *multiflora* Bunge, Rawalpindi, April 1934, *13857*.

Since there are only uredia present in this collection and since only telia were described by Miura this determination can be only tentative. The host of *U. Kondoi* is *G. multiflora*. *Uromyces Gueldenstaedtiae* Liou & Wang is probably synonymous and it, too, has been described only in the telial stage.

The uredia in Stewart's collection are mainly hypophyllous, scattered or frequently with a central sorus surrounded by a ring of secondary sori, roundish, 0.3–1.0 mm. in diameter, pale cinnamon-brown, surrounded by the ruptured epidermis; the urediospores vary from nearly globoid to ellipsoid and measure 15–18 × 18–24 μ; the wall is pale cinnamon-brown, 1.5–2 μ thick, finely echinulate and provided with 4–6 scattered pores.

*UROMYCES LAPPONICUS Lagerh., *Astragalus Maddenianus* Benth., Burzil Pass, Aug. 27, 1939, *19004*.

UROMYCES LYCOCTONI (Kalchbr.) Trotter, *Aconitum laeve* Royle, near Gulmarg, July 11, 1935, *14836;* below Kun Patthar, Aug. 14, 1939, *18510*.

UROMYCES POLYGONI (Pers.) Fuckle, *Polygonum cognatum* Meissn., Burzil Chowki, Aug. 27, 28, 1939, *19101, 19182; Polygonum paronychioides* C. A. Mey., Chorwan to Burzil Chowki, July 26, 1940, *19780*.

UROMYCES PROËMINENS (DC.) Pass., *Euphorbia hispida* Boiss., Titwal, July 10, 1939, *17416*.

The hosts of these rusts were named at the New York Botanical Garden by Dr. R. R. Stewart.

THE ARTHUR HERBARIUM,
PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION,
LAFAYETTE, INDIANA

DERMATEA BICOLOR ON AMELANCHIER[1]

J. WALTON GROVES[2]

(WITH 3 FIGURES)

In the fall of 1941, a species of *Dermatea* which was tentatively identified as *D. Brenckleana* (Sacc.) Seaver, was collected on *Amelanchier* at the Petawawa Forest Experiment Station, Ontario. This species was originally described by Saccardo (**1920**) as a *Patinella* and was transferred to *Dermatea* by Seaver and Velasquez (**1933**). A part of the type collection of *Patinella Brenckleana* was kindly loaned by Dr. D. H. Linder of the Farlow Herbarium and this proved to be identical with the Petawawa material. A conidial stage belonging to the genus *Micropera* and agreeing with that described by Seaver and Valasquez (**1933**) was found associated with the *Dermatea*, and cultures from ascospores and conidia proved to be identical and both produced the same conidial stage in culture. The genetic connection was, therefore, considered to be established.

On comparing this material with other species of *Dermatea*, the writer was impressed by its similarity to the fungus described as *Tympanis bicolor* by Ellis (**1883**). A part of the type collection of this species had been examined in the Durand Herbarium, Cornell University in 1935 and it was unquestionably a species of *Dermatea*, but since the host was not named and the fungus did not agree with any other species known to the writer, it had not been possible to place it satisfactorily at that time.

Although no conidial stage was observed on the Ellis specimen, the apothecia appeared to be morphologically identical with the Petawawa material, so an attempt was made to have the host of the Ellis specimen identified. At the writer's request, Professor H. M. Fitzpatrick had sections made of the wood of this specimen. This was done by Mr. Victor M. Cutter Jr. who expressed the

[1] Contribution No. 729 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.

[2] Agricultural Scientist, Central Laboratory, Ottawa.

opinion that the wood was certainly Rosaceous and probably *Amelanchier*. The slides were examined by Professor I. W. Bailey, Harvard University, who confirmed the identification as *Amelanchier*.

It is, therefore, concluded that *Dermatea Brenckleana* (Sacc.) Seaver and *Tympanis bicolor* Ellis are identical, and in view of the fact that *T. bicolor* is the older name, it becomes necessary to make a new combination.

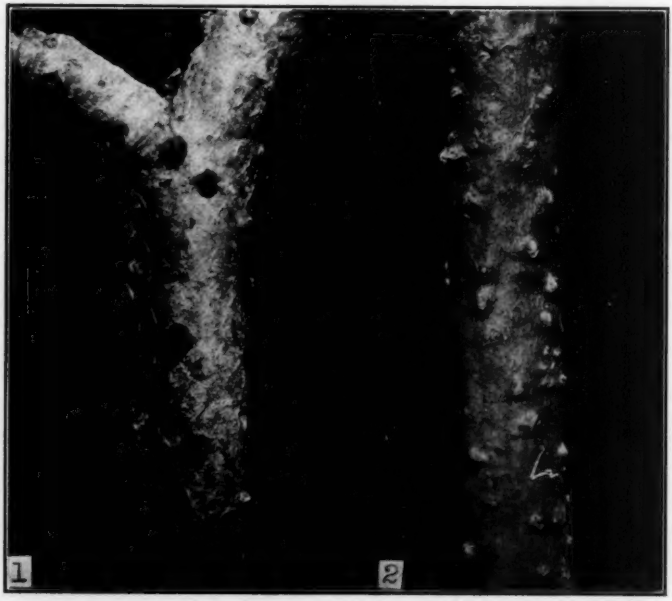


FIG. 1, apothecia of *D. bicolor*, × 4 approx.; 2, conidial stage of *D. bicolor*, × 4 approx.

Dermatea bicolor (Ellis) comb. nov.

Tympanis bicolor Ellis, Amer. Nat. **17**: 193. 1883.
Cenangium bicolor Sacc. Syll. Fung. **8**: 557. 1889.
Cenangium dichroum Sacc. Syll. Fung. **8**: 1143. 1889.
Patinella Brenckleana Sacc. Mycologia **12**: 203. 1920.
Dermatea Brenckleana Seaver, Mycologia **25**: 142. 1933.

Apothecia erumpent, gregarious, mostly separate, sometimes in more or less elongated clusters, circular or undulate, sessile, narrowed below, 0.5–1.5 mm. in diameter, 0.5–1.0 mm. in height, at first slightly furfuraceous, yellowish or greenish when moist, finally dark brown to black and glabrous, hard, leathery to horny in consistency, becoming more fleshy-leathery when moist; hymenium concave to plane or slightly convex, greenish when young and moist, drying dark brown to black, slightly roughened, at first with a thick, raised, furfuraceous, yellowish margin which may disappear later; tissue of the basal stroma pseudoparenchymatous, composed of hyaline to yellowish, irregular cells about 5–12 μ in diameter, arranged in more or less vertically to obliquely parallel rows above, thicker walled and darker toward the outside forming a firm excipulum, in the central part becoming more elongated and interwoven, subhymenium a zone of interwoven, ascending, hyaline hyphae about 2–4 μ in diameter; asci cylindric-clavate, tapering below to a short, slender stalk, eight spored, (56)–60–70–(87) $\times$ 8–10 μ; ascospores ellipsoid-fusiform, straight or slightly curved, one or two celled, hyaline, becoming yellowish-brown, irregularly biseriate to uniseriate, (11)–12–15–(16) $\times$ 3.0–4.0–(4.5) μ; paraphyses hyaline, filiform, septate, simple or branched, 1.5–2.0 μ in diameter, the tips scarcely swollen but more or less glued together forming an epithecium.

Conidial fruiting bodies splitting the bark, more or less immersed to slightly erumpent, gregarious, variable in shape, circular to elongated or angular, 0.2–0.8 mm. in diameter, 0.2–0.4 mm. in height, yellowish, furfuraceous, more or less wrinkled, soft, waxy in consistency, becoming more fleshy when moist, containing one to several, more or less lobed cavities which open irregularly and sometimes widely, exposing the greenish to yellowish spore masses; tissue compact, pseudoparenchymatous, composed of hyaline, almost isodiametric to irregular cells about 4–7 μ in diameter, sometimes more elongated and interwoven above; conidiophores lining the cavity, hyaline, cylindric, septate, not observed branching, tapering to a pointed tip, 15–30 $\times$ 1.5–2.5 μ; conidia hyaline, fusiform, sickle-shaped or almost straight, pointed at the ends, one celled, occasionally two celled, (12)–15–20–(25) $\times$ 2.5–4.0 μ; no microconidia observed in nature.

Host: *Amelanchier* spp.

SPECIMENS EXAMINED: Durand Herbarium. *7440, Tympanis bicolor* Ell. Decorah, Iowa. Coll. E. W. Holway (*220*), Aug. 1882. Type.

Farlow Herbarium. North Dakota Fungi—Brenckle *1196*. *Patinella Brenckleana* Sacc. n. sp., on *Amelanchier alnifolia,* Whitestone Gully. Coll. J. F. Brenckle, Oct. 3, 1920. Type.

Mycological Herbarium, Science Service, Ottawa. On *Amelanchier* sp. *7338(715)*,[3] *7512(720)*, *7534(725)*, *7935(768)*, Mason L., Highview, Petawawa Forest Experiment Station, Ontario.

University of Toronto Herbarium. On *Amelanchier* sp. *17324 (412)*, Temagami Forest Reserve, Ontario.

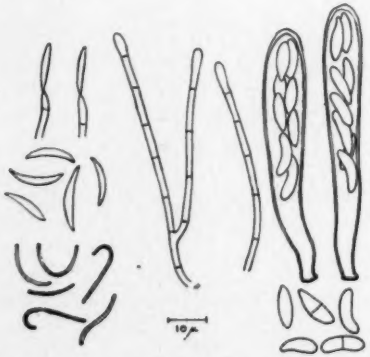


FIG. 3. *Dermatea bicolor.* Drawings of asci, ascospores, paraphyses, conidiophores, conidia and microconidia.

On malt extract agar the colonies reach a diameter of 5.5–6.5 mm. in three weeks. They are whitish to pale buff with a broad appressed margin and short, more or less tufted, aerial mycelium at the centre. Conidial fruiting bodies develop as more or less circular, rounded, brownish, fleshy stromata, about 1–2 mm. in diameter and 0.8–1.5 mm. in height, glabrous or very slightly tomentose, containing several cavities in the upper part. The cavities are at first globoid, becoming more or less lobed. The tissue is composed of closely interwoven, hyaline hyphae about 3–5 μ in diameter. The conidiophores and conidia are similar to those found in nature. Microconidia have been observed occasionally in culture, hyaline filiform, one celled, variously curved, frequently more or less hooked at one end, 12–22 $\times$ 1.0–1.5 μ.

[3] The numbers in parentheses refer to duplicate specimens in the herbarium of J. W. Groves.

This species is distinguished by its occurrence on *Amelanchier*, the small asci and spores, and the small conidia. In many respects it is close to *Dermatea Ariae* (Pers.) Tul. which occurs on *Sorbus*, and which was discussed by Groves (**1940**). The ascospores and conidia are very similar in the two species, and the microconidia in both are rather long and frequently hooked at one end; but the asci rarely exceed 75 μ in length in *D. bicolor*, whereas they are rarely less than 75 μ in *D. Ariae*. The apothecia of *D. bicolor* are usually a little larger and more strongly erumpent than those of *D. Ariae*, and are greenish to black, not showing the reddish-brown of *D. Ariae*. The conidial fruiting bodies are also different. In *D. Ariae* they are more or less conical to flask-shaped, usually fairly uniform in shape, and containing a single cavity. In *D. bicolor* they are more variable in shape, consisting of an irregular, fleshy stroma containing one to several cavities. The appearance of the two fungi in culture is also quite different.

D. bicolor probably occurs more commonly than the published records would indicate. It was found in abundance at Petawawa in 1941 and again in 1942. The Temagami collection was made in 1935 and consisted of a single small branch lying on the ground and bearing a few apothecia of a *Dermatea*. It was not possible to identify the host at that time and, since the fungus seemed different from any species of *Dermatea* known to the writer, it was carried in culture as an unidentified species. When cultures were obtained from the Petawawa material they were recognized as being the same as those from the earlier Temagami collection. At the writer's request, sections of the wood of this collection were compared with sections of *Amelanchier* by Mr. C. G. Riley, and he stated that they were similar in every way.

This study thus provides a demonstration of the necessity for a careful determination of the host plant when collecting fungi, and also of the value of cultures as an aid to identification.

ACKNOWLEDGMENTS

The writer is indebted to Professor H. M. Fitzpatrick, Cornell University, for making the type of *Tympanis bicolor* available for examination and for having sections made of the wood; to Mr. Victor M. Cutter Jr., Cornell University, for making these sections

and examining them; to Professor I. W. Bailey, Harvard University, for final checking of these sections; to Dr. D. H. Linder, Harvard University, for the loan of the type of *Patinella Brenckleana;* and to Mr. C. G. Riley, Division of Botany and Plant Pathology, Science Service, Ottawa, for checking the wood of the Temagami collection.

CENTRAL EXPERIMENTAL FARM,
OTTAWA, CANADA

LITERATURE CITED

Ellis, J. B. New species of North American Fungi. Amer. Nat. **17**: 192–196. 1883.

Groves, J. W. Some *Dermatea* species and their conidial stages. Mycologia **32**: 736–751. 1940.

Saccardo, P. A. Notae mycologicae ser. XXIX. Micromycetes Dakotenses et Utahenses a Doct. J. F. Brenckle Lecti et Communicati. Mycologia **12**: 199–205. 1920.

Seaver, F. J. & Velasquez, J. *Dermea* and *Pezicula.* Mycologia **25**: 139–149. 1933.

A NEW SPECIES OF PHYLLACTINIA[1]

DAVID H. LINDER

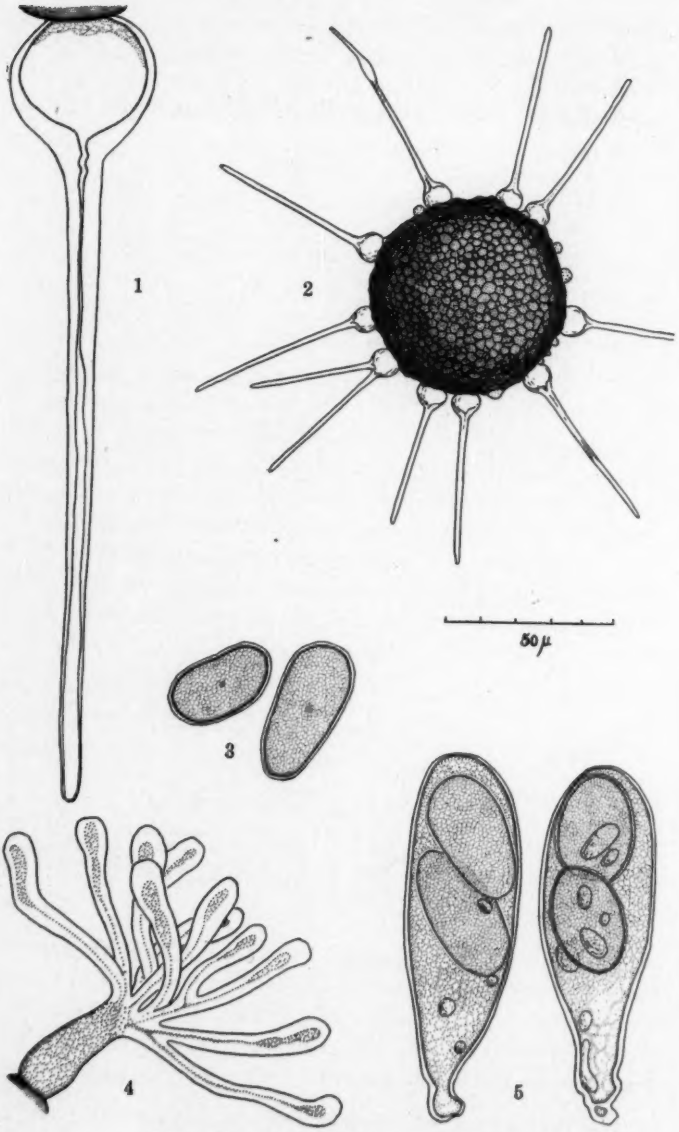
(WITH 1 FIGURE)

In his monographic study of the Erysiphaceae, Salmon (**1910**) recognized but a single species of *Phyllactinia,* one which occurs over a wide host and geographic range. Since that time Blumer (**1933**), Homma (**1937**), and others have recognized additional species, varieties, and forms. In examining material collected for the Farlow Herbarium, the writer encountered a specimen on *Eleagnus argentea* Pursh which, although resembling *P. suffulta* in general aspects, produces pronouncedly and consistently larger cleistothecia. The size of the cleistothecia, 247–303 μ in diameter, ranges this species among those segregates of *P. suffulta* (Rebent.) Sacc. [*P. Corylea* (Pers.) Karst. p.p.] that are represented by *P. Salmoni* Blumer [Syn.: *P. imperialis* Homma], *P. Hippophaës* Thuem., and *P. roboris* (Gachet) Blumer, the differences between which are shown in the following table:

Species	Perithecia		Asci		Ascospores
	No. appendages	Diam.	Number	Size	Size
P. Salmoni	10–30	294–362 μ	20–30	80–110×30–50 μ	35–45×20–25 μ
P. Hippophaës	many	246–272 μ	25–40	70–80 ×25–40 μ	20–35×15–20 μ
P. roboris	15–30	214–250 μ	15–30	70–90 ×25–35 μ	30–40×19–23 μ
P. suffulta	6–12	160–230 μ	10–30	70–100×25–40 μ	25–40×15–25 μ
P. n.sp.	8–13	247–303 μ	30–35	97–110×34–42 μ	38–47×19–23 μ

A comparison of the species on *Eleagnus* with others listed in the above table shows that while its cleistothecia fall within the size classes of *P. Salmoni* and *P. Hippophaës,* it nevertheless differs from these two species by the smaller number of appendages that are produced and by the somewhat larger though proportionately

[1] Contribution from the Laboratories of Cryptogamic Botany and the Farlow Herbarium, Harvard University, no. 222.



FIGS. 1–5. *Phyllactinia Eleagni* Linder.

narrower ascospores. In addition, there is the added distinction that the asci and ascospores are strongly colored by the presence of a greenish-yellow pigment, but there is reason to suspect that the pigment may not be too stable a character since it tends to bleach on standing in potassium hydroxide. Since, however, the specimens were six years old when first studied and the pigment was very conspicuous, more conspicuous than in equally recent collections of *P. suffulta,* it seems worthy of mention as a character that may be of taxonomic value. In view of the characters mentioned previously, and also because Blumer (*l.c.*) has shown by biometric studies which have been supported by the inoculation experiments of Hammarlund (**1925**) that there is a greater degree of specificity among the Erysiphaceae than has been previously acknowledged, it seems desirable to recognize this fungus as a new species and for it the following formal description is given:

Phyllactinia Eleagni Linder, sp. nov. (FIGS. 1–5.)

Cleistotheciis nigris, 247–303 μ diametro, plerumque hypophyllis; appendicibus 8–10–(13), leniter brevioribus vel longioribus quam cleistothecia, apicem rotundatum versus nonnihil attenuatis; ascis bisporis, 30–35 in cleistothecio, 97–110 × 34–42 μ, protoplasmato a pigmento viride-luteo colorato; ascosporis ovoideis vel ellipsoideis, 38–47 × 19–23 μ, protoplasmato a pigmento viride-luteo colorato.

Cleistothecia numerous, mostly hypophyllous, black when mature, 247–303 μ in diameter. **Appendages** 8–10–(13), slightly shorter to slightly longer than the diameter of the cleistothecium, even or occasionally swollen, slightly tapering to a bluntly rounded apex, occasionally two appendages arising from a single bulbous base. **Asci** 30–35 in a cleistothecium, 97–110 × 34–42 μ, 2-spored, the contents deeply stained by a greenish yellow pigment. **Ascospores** large, ovoid to ellipsoid, 38–47 × 19–23 μ, the contents deeply stained with a yellowish green pigment.

On *Eleagnus argentea* Pursh, upper Wind River, some miles below Dubois, Fremont Co., Wyoming, August 27, 1936, *George & Ruth Rossbach, No. 402,* **TYPE.**

LITERATURE CITED

Blumer, S. 1933. Erysiphaceae Mitteleuropas. Beitr. Kryptogamenfl. Schweiz **7**: 378–402.

Hammarlund, C. 1925. Zur Genetik, Biologie und Physiologie einiger Erysiphaceen. Hereditas **6**: 1–126.

Homma, Y. 1937. Erysiphaceae of Japan. Hokkaido Imp. Univ. Jour. Faculty Agric. **38**: 403–418.

Salmon, E. S. 1900. Monograph of the Erysiphaceae. Torrey Bot. Club Mem. **9**: 224–236.

EXPLANATION OF FIGURES

FIGS. 1–5. *Phyllactinia Eleagni* Linder. *1*, a typical appendage, slightly tapering to the abruptly rounded apex; *2*, a characteristic cleistothecium with ten appendages (one branched) and also showing the aborted appendages represented by the scattered light-colored cells on the margin; *3*, ascospores; *4*, a penicillate cell; *5*, two asci, the right hand one containing two fully differentiated ascospores (figs. 1, 3–5 approximately × 460, fig. *2* approximately × 91).

MYCOLOGICAL NOTES. VII

C. L. Shear

29. Mycosphaerella Grossulariae and M. Ribis

The question arises as to the correct name to apply to the leaf spot fungus on *Ribes rubrum* and other species of *Ribes* in this country. The current usage here is *Mycosphaerella Grossulariae* (Fries) Lind. This was used by Stone (Phytopath. **6**: 109, 419. 1916) for the American fungus, which he proved was the perfect stage of a *Septoria* which he referred to *S. Ribis* Desm. He also showed by inoculation experiments, that the fungus infects *Ribes rubrum, R. nigrum* and *R. Grossularia.*

The specific name *Grossulariae* Fries was originally used by him for *Sphaeria Grossulariae* (Syst. Myc. **2**: 521. 1822). Later (Summa Veg. Scand. 394. 1849) he also lists it as *S.* (*Sphaeria*) *Grossulariae* under section *Sphaerostomae,* citing his Scler. Suec. Exs. no. 57 and adding "Potius Diplod." Fuckel seems to have been the first to report on a microscopic examination of Fries' specimen of this number. He states (Symb. Myc. 133. 1869) that Fries' plant is a *Pleospora* which he calls *Pleospora Grossulariae* (Fries) Fuckel. Berlese (Icon. Fung. **2**: 20, *pl. 27.* 1900) makes this a synonym of *Pleospora herbarum* (Pers.) Rab. We have examined two specimens of Fries no. 57 and find on both only a *Pleospora* which agrees with *P. herbarum.*

Klebahn also regards Fries' plant as *P. herbarum.* How did the application of Fries' name to a *Mycosphaerella* arise? It apparently began with Auerswald who transferred Fries' name *Grossulariae* to *Sphaerella* as *S. Grossulariae* (Fries) Auers. Citing Fries Scler. Suec. no. 57 and Rab. Herb. Myc. (1st ed.), no. 1563 Auerswald's description (Gonnerman and Rabenhorst Myc. Europ., pt. 5, 11. 1870) is of a *Mycosphaerella* and was evidently based on the Rabenhorst specimen (no. 1563). There is no proof that he found such a fungus on the Friesian specimen he cites, though it is possible that the leaf in the specimen may have shown

both *Pleospora* and *Mycosphaerella*. If so, Fries' description should have made it clear which fungus he was naming. Notwithstanding Fuckel's work Winter (in Rab. Krypt.—Fl. 1^2: 387. 1885) followed Auerswald and Lindau later (in Engler—Prantl Nat. Pflanzenfam. 1: 424. 1897) transferred the name to *Mycosphaerella* as *M. Grossulariae* (Fries) Lind.

Klebahn (Haupt—und Nebenfruchtformen der Askomyceten 61–72. 1918) discusses these species under the head of *Mycosphaerella Ribis*, describes the life cycle and concludes that *Sphaerella Grossulariae* Auers. (l.c.) not *Sphaeria Grossulariae* Fries, is the same as *M. Grossulariae* (Fries) Lind. He confirms Stone's finding of two years earlier that *Septoria Ribis* Desm. is the pycnidial stage but does not mention his paper, which due to the interference of the first world war he probably had not seen. Since Fries' name *Grossulariae* is untenable, having been applied to an entirely different fungus, *Pleospora*, Klebahn adopts the name *M. Ribis* (Fuckel) which he regards as a synonym of Auerswald's *Sphaerella Grossulariae* and *Mycosphaerella Grossulariae* Lind. not *Sphaeria* Fries, though he points out the great variability in the perithecia as well as the pycnidial forms on the various species of *Ribes* and calls attention to the need of much further study to determine the validity or synonymy of the various names that have been used. We agree with Stone (l.c.) that *Sphaerella Ribis* Fuckel is a very doubtful synonym of *S. Grossulariae* Auers. and *Mycosphaerella Grossulariae* Lind. Fuckel says (l.c.) that *S. Ribis* has perithecia on the *upper* side of the leaves and that the ascospores are 16 by 4 μ. The various specimens of *Mycosphaerella* on *Ribes* from Europe and America which we have examined have the perithecia all on the *under* side of the leaves and the ascospores according to our measurements are 21–27 by 3 μ. Auerswald gives 27 by 3 μ, Stone 28–35 by 3–4, and Klebahn 18–26 by 3–3.5. Klebahn's shortest spores were 18 μ. Until someone examines Fuckel's type specimen and confirms or corrects his description we do not feel justified in citing *Sphaerella Ribis* Fuckel as a synonym of *S. Grossulariae* Auers. In the meantime *Sphaerella Grossulariae* Auers. or *Mycosphaerella Grossulariae* (Auers.) Lind. seems to be the most certain appelation for the common currant and gooseberry leaf spot fungus. The transfer of Fuckel's

Sphaerella Ribis to *Mycosphaerella* seems to have been made first by Feltgen (Vorst. Pilzflora Luxemb. **1**: 285. 1899) and not by Jaap. (Verh. Bot. Ver. Prov. Brand. II: **49**: 14. 1907) as sometimes cited. *M. Ribis* (Fuckel) Felt. would therefore be the correct citation.

Sphaerella Grossulariae Auers. not Fries (l.c.), as shown by an examination of a specimen of No. 1563 Rab. Herb. Myc. Exs. 1st ed. which he cites as representing his plant, was kindly supplied by Dr. Linder from the Farlow Herbarium. This agrees entirely with Auerswald's description and is the plant which Lindau (l.c.) transferred to *Mycosphaerella*. In a so-called new edition of Rabenhorst's Herb. Myc. Exs. no. 251 is supposed to be the same species. It is labelled "*Sphaeria Grossulariae* Fr. Ad Grossulariae ramulos siccos." Some of the sets of this 2d ed. of Rabenhorst are said to be spurious and this is evident from the fact that one set with this number and name is *Dothidea ribesia* on *Ribes* twigs and the other with the same number and name is *Mycosphaerella Grossulariae* (Auers.) Lind. on a leaf of *Ribes*.

According to our present information the perfect stage of our currant and gooseberry leaf spot fungus, *Septoria Ribis* Desm., is *Mycosphaerella Grossulariae* (Auers.) Lind. Whether *M. Ribis* (Fckl.) Felt., which Klebahn regarded as the same, is a form of the same species or a separate one seems uncertain at present.

30. SPHAERIA MELASTOMA FRIES

This species was first described by Fries (K. Vet. Akad. Hand. **38**: 90. 1817) as follows:

"*Sphaeria melastoma*, tecta convexa, linea nigra et superne epidermide stroma albidum arcte includentibus, sphaerulis paucioribus ovatis immersis, collis in disco erumpenti-elliptico planiusculo atro subexsertis minutis sparsis hemisphaericis.

Vexer pa qvistar af vild Appel.

Hvarje varta gor barken rundt ikring blekare och dess betachning bildas mest af barkens ofverhud, hvarfore den star foljande afdelning nara. Fastet arhvitt. Disken svart, icke dess mindre tror jag den komma *Sph. Nivea* narmast. Hylshusen kring 6 till antalet, tamligen stora, agglika. Oppningarne atskiljas endast med bevapnadt oga."

In 1823 (in Kunze and Schmidt Myc. Heft. **2**: 44), Fries published another description as follows:

"47. *Sphaeria* (Ser. II. Sect. 4. a) *melastoma:*
Tecta convexa, stromate albo, linea nigra et superne epidermide arcte incluso, peritheciis simplicibus ovatis collis elongatis in disco erumpenti-elliptico plano atro prominulis hemisphaericis. V. A. H. In ramis emortuis Pyri mali etc."

Later in the same year (Syst. Myc. **2**: 388. 1823) he described it again:

"147. *S. melastoma,* convexa, stromate albido arcte incluso, disco sub-elliptico, ex ostiolis minimis hemisphericis stipatis obliterato.
Fries V. A. H. 1817, p. 90 Kunz. Myc. Heft. 2, p. 44.
Inter minores. Conceptaculum ligno subadnatum, epidermide bullata expallente tegente avulsa dimidiatum persistit. Perithecia ovata, pro ratione majuscula. Discus minutus, opacus, niger, ex ostiolis nudo oculo minime discernibilibus. Ad cortices Pyri Mali. Vere. (v.v.)"

In 1849 (Sum. Veg. Scand. 411) he lists this fungus under the genus *Valsa* as follows: "(15) *V. melastoma* Fr. 3–4."

Nitschke (Pyren. Germ. 237. 1869) describes *Valsa melastoma* Fries from an original specimen of Fries' fungus on *Pyrus Malus* found in Kunze's herbarium. In this specimen Nitschke found polysporous asci 30 by 6 μ with subhyaline uni-cellular, slightly curved ascospores, 5 by 3 μ. This specimen was on a branch of *Pyrus Malus,* as stated by Fries. This was the first distinctive description of the species. Later the same year, Fuckel (Symb. Myc. 203. 1869) described the genus *Valsella* and says that *Valsa melastoma* Fries belongs here.

Valsa melastroma Fries is an entirely different fungus from that with which it has been confused on account of the typographic error on Fries' label of his specimen of *Sphaeria melastroma* (Scler. Suec. no. 223) which reads *melastoma* instead of *melastroma* as explained above.

Nitschke says the size and form of the stromata of *V. melastoma* show great similarity to *Valsa translucens* De Not. and *V. diatrypa* Fries and among the polysporous spp. to *V. polyspora* Nits.

Sphaeria melastoma Fries was first referred to the genus *Valsella* by Fuckel as mentioned above, though the combination is usually credited to Saccardo (Syll. Fung. **1**: 162. 1882).

Karsten (Myc. Fen. **2**: 149: 1873) reported and described the fungus as *Valsa melastoma* Fries on *Pyrus Malus* giving the asci as 30–50 by 6 μ and the spores 4–7 by 1 μ, essentially as per

Nitschke. Schweinitz (No. Am. Fun. 201, no. 1341. 1832) reported it on *Malus,* from Bethlehem, Pa. and on the basis of this record Ellis and Everhart (No. Amer. Pyren. 517. 1892) included the species, giving Saccardo's description (l.c.). An examination of a part of Schweinitz' specimen in Michener's herbarium shows an entirely different fungus. Only typical stromata and conidia of *Cytospora ambiens* Sacc. were found. We have seen no other report of the species from this country. From the descriptions and illustrations in Berlese Icones Fungorum (pp. 105–108, *pls. 129–134.* 1905) drawn from type or authentic specimens of the principal species of *Valsella,* it is evident that no morphological characters of specific value have yet been found to separate them. The difference in host plants is not sufficient. *Valsella adherens* Fuckel on *Betula, V. minima* Niessl on *Viburnum, V. padina* Sacc. on *Prunus padus* and *V. Salicis* Fuckel on *Salix* appear to be mere host forms of one species. We are inclined to go a step further and agree with Petrak (Ann. Myc. **17**: 61. 1919) that *Valsella* is probably only a polysporous condition of *Valsa.* He states that he has numerous specimens of *V. polyspora* Nke. on *Betula* in which he found 4 and 8 spored as well as polysporous asci. The 4 and 8 spored asci are known as *Valsa Auerswaldi* Nke. He also found associated with the *Valsella; Cytospora personata* Fries, probably the pycnidial stage of the *Valsella* and *Valsa.* He concludes that *Valsella adherens* Fuckel and *V. polyspora* Nke. are only polysporous forms of *Valsa Auerswaldi* Nke. Berlese (l.c. p. 108) also reports *Cytospora* associated with *Valsella padina* (Saac.) Berl. The conclusion is that *Sphaeria melastoma* Fries is *Valsella melastoma* (Fries) Fuckel which probably has several synonyms and should perhaps be returned to the genus *Valsa* where Fries finally placed it.

31. SPHAERIA MELASTROMA FRIES

Fries (Syst. Myc. **2**: 399. 1822) described *Sphaeria melastroma* as follows:

"173. *S. melastroma,* pustulata, subverrucaeformis, peritheciis aggregatis, disco erumpente angulato nigro obsolete pertuso.

(Scl. Suec. exs. n. 223.)

Habitus S. verrucaeformis & angulatae, sed minus prominet & conceptaculum omnino corticale. Perithecia subsena, erectiuscula, conferta, profunde immersa, verticaliter collabentia. Discus epidermide angulato-fissa erumpens, a cortice interiore formatus, sed superficies plana, laevis, opaca, nigrofacta. Ostiola discum perforant, sed non prominent. Ambigit inter hanc tribum & Versatiles!! In ramis exsiccatis Ulmi. Aut.—vere. (v.v.)"

Fries later (Summa Veg. Scand. 412. 1849) listed this species under *Valsa* as follows: "36. *V. melastroma* Fr. 1. S.S. 223." This is the same number cited with the original description above. Unfortunately the specific name on the label of the specimens of number 223 of his Exsiccati, due evidently to a typographical error, was *melastoma* instead of *melastroma*. To make matters more confusing Cesati and de Notaris (Schem. Class. Sfer. Ital. 32. 1863) examined a specimen of Fries no. 223 and copied the erroneous name *melastoma* from the label. They give a description of spores found on their specimen of this number as follows: "Sporidia ellipsodiea majuscula, fusco badia 7–8 locularia, loculis pene omnibus septo longitud. dimidiatis." They list it as doubtfully belonging to their genus *Pseudovalsa*.

The next description of a specimen of Fries' no. 223, presumably from the Kew Herbarium, was by Cooke (Proc. Phil. Acad. 122. 1877) where he uses the correct specific name instead of that on the label as follows: "86. *Valsa melastroma* Fr. S.V.S. p. 412. Schw. Am. Bor. 1358. Sporidia elliptic, uniseptate, brown, .032 × .014 mm. On bark of *Ulmus,* Salem (Schw.). We have seen no American specimen. Character of sporidia given from specimen published by Fries Scler. Suec. 223."

The report of this species by Schweinitz (N. A. F. no. 1358) on elm from Salem, No. Car., is apparently based upon a misidentification of Fries' species. We find no specimen in Schweinitz' herbarium, nor in Michener's. According to the check mark before this name in Berkeley's copy of Schw. N. A. F. he had a part of Schweinitz' collection which is presumably at Kew, but Cooke evidently did not find it. There is, however, in the Curtis collection at Harvard a part of Schweinitz' specimen from Salem. Through the kindness of Dr. Linder we have been able to examine this and find it to bear old small stromata of *Botryosphaeria*. Sections show the typical stromatic characters and locules of this genus. The locules are mostly empty and no *Botryosphaeria*

spores were found. In a few of the old locules there are free spores and hyphae of what is probably a saprophyte, perhaps a *Stemphylium* or *Alternaria*, with light brown muriform spores with 5–6 cross septa, 15–18 by 9–11 μ.

Saccardo (Syll. Fung. 1: 745. 1882) places the fungus in the genus *Valsaria* as *V. melastroma* (Fries) Sacc., citing Fries' original description and his specimen no. 223. He also cites Cooke (l.c.) and gives his description of the spores. From the conflicting reports of de Notaris and Cooke, on two different specimens of this number of Fries exsiccati two quite different fungi were present, as not infrequently happens. The specimen which de Notaris (l.c.) described as a doubtful *Pseudovalsa*, Saccardo (Syll. Fung. 2: 328. 1883) calls *Fenestella melastoma* (Fr. p.p.) Sacc., citing Scler. Suec. no. 223 and giving de Notaris' description of the specimen he examined. Saccardo did not note the typographical error on the label, which should have been *melastroma* and so the two species were confused still further. Winter (in Rab. Krypt.—Fl. 1^2: 743. 1887) has the true *V. melastoma* Fries under the subgenus *Valsella* and also puts under doubtful species of *Fenestella* with a question mark, *F. melastoma* of Saccardo.

On the specimens from four different sets of Fries Scler. Suec. no. 223 which we have examined we find only *Valsaria melastroma* (Fries) Sacc. as reported and described by Cooke (l.c.), who apparently recognized that the name *melastoma* on the label of 223 was a mistake, as is shown by Fries' spelling *melastroma* in his original description and citation of this number.

The fungus found by de Notaris (l.c.) on his specimen of Fries no. 223 and which is referred to *Fenestella* by Saccardo (l.c.) is, according to Berlese (Icon. Fung. 2: 74. 1900), *F. vestita* (Fries). Berlese says he compared an original specimen of *F. melastoma* Sacc. (error for *melastroma*) (Scler. Suec. no. 223) in the Paris herbarium. This confirms de Notaris' record and shows that at least two of Fries' specimens of no. 223 had *Fenestella* as well as probably the *Valsaria* to which Fries' description clearly applies and which we have found on four specimens of this number. The specimens of Fries' type material, Scler. Suec. 223, which we have examined show only small valsoid pustules embedded in the bark of elm branches, with few submembranous

perithecia, with asci 100–150 long, spores overlapping uniseriate, brown, uniseptate, scarcely constricted at the septum, very variable in size, ranging from 22–36 by 12–18 μ, no paraphyses seen. This is not a good *Valsaria* as typified by *V. insitiva,* but seems more closely related to *Melanconiella.* Good fresh specimens and a knowledge of its life cycle are needed to determine its true generic and specific status.

The conclusion is that *Sphaeria melastroma* Fries (Scler. Suec. no. 223) is *Valsaria melastroma* (Fries) Sacc. and not *Fenestella melastoma* Sacc. which was found on two specimens by de Notaris and Berlese.

BUREAU OF PLANT INDUSTRY,
BELTSVILLE, MARYLAND

A NEW SPECIES OF TRICHOLOMA

ALEXANDER H. SMITH AND MAURICE B. WALTERS

(WITH 1 FIGURE)

Tricholoma umbrosum sp. nov. (FIG. 1.)

Pileus 5–9 cm. latus, obtusus vel convexus, siccus, laevis demum areolatus, cinnamomeo-umbrinus; odor et sapor valde distinctus; lamellae latae, adnatae vel subdecurrentes, confertae, cinnamomeo-umbrinae dein rubro-maculatae; stipes 3–5 cm. longus, 1.5–2 cm. crassus, deorsum attenuatus, umbrinus dein rubro-maculatus, solidus; sporae 7–9 × 3–4 μ, amyloideae.—Specimen typicum legit A. H. Smith, prope Truro, Nova Scotia, July 16, 1931 (Wehmeyer n. 640); in Herb. Univ. of Mich. conservatum.

Pileus 5–9 cm. broad, obtuse with an incurved margin at first, becoming broadly convex to plane or slightly depressed in age, surface dry and unpolished, smooth or in age with small areolate patches over or around the disc, not fibrillose scaly, color "drab gray" (dark gray) when young, becoming "cinnamon-drab" (gray, tinged vinaceous) at least on the disc in age; flesh thick, concolorous with the surface, staining reddish where bruised, odor and taste very strong and resembling that of fresh cucumbers; lamellae broadly adnate to slightly decurrent, close, broad, (1 cm. at the stipe), tapered to the margin, concolorous with the pileus but staining reddish readily when bruised, edges somewhat eroded; stipe 3–5 cm. long, 1.5–2 cm. thick at the apex, equal downward but constricted at the base and with a more or less distinct pseudorhiza, solid, more or less concolorous with the pileus, staining reddish where bruised, apex slightly fibrillose-pruinose.

Spores 7–9 × 3–4 μ, narrowly ellipsoid to slightly curved in one view, white in mass, amyloid, smooth or under oil immersion appearing slightly reticulate when mounted in chloral hydrate iodine solution; basidia four-spored; pleuro- and cheilocystidia not differentiated; gill trama homogeneous, subparallel to interwoven, the hyphae of narrow cells, yellowish to reddish in iodine, lactiferous hyphae present; pileus trama homogeneous beneath an interwoven surface layer of hyphae 10–12 μ in diam., these hyphae having dark mummy brown walls (revived in KOH), clamp connections present, tramal body of hyaline compactly interwoven hyphae the same size as or smaller than those on the surface, these sometimes vinaceous red when treated with iodine.

Gregarious under spruce in a pasture, Colchester County, Nova Scotia, July 16, 1931 (Wehmeyer no. *640*); under conifers, Newfound Gap, Great Smoky Mountains National Park, N. C., Aug. 17, 1938, A. H. Smith no. *10,301;* near hemlock trees, Cleveland Heights, Ohio, July 7, 1942, Maurice B. Walters.

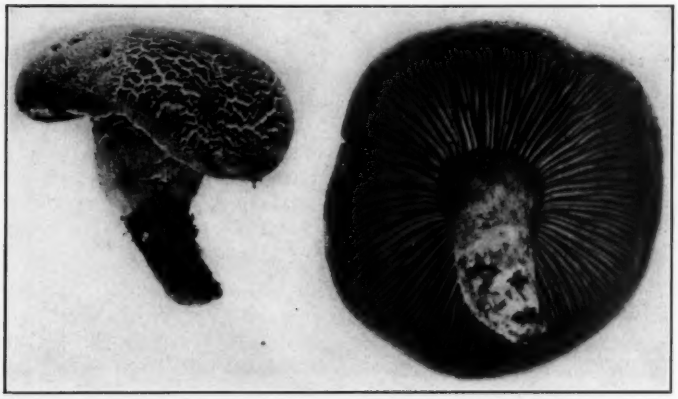


FIG. 1. *Tricholoma umbrosum* Smith & Walters. × ½.

Observations: The taxonomic position of this very curious species is somewhat in doubt. The amyloid spores exclude it from either *Tricholoma* or *Clitocybe* if these genera are regarded in the modern restricted sense, but it cannot be referred to *Melanoleuca* (restricted sense, non Murrill) for obvious reasons, namely the smooth or nearly smooth spores, lack of cystidia, and presence of clamp connections to say nothing of its general appearance. In *Leucopaxillus,* where it may eventually be desirable to place it, a new subgenus would have to be erected. It shows no affinities to any of the known smooth spored species of that genus. Singer, to whom material was sent for examination, thought that it might belong in *Cantharellula,* but even there it did not appear to have any discernible relationships. We have described it in *Tricholoma* in order to place it on record. It bears a certain superficial resemblance to the fleshier species of the *Tricholoma terreum* complex, but the surface of the pileus instead of appearing to be covered with radially arranged fibrils has the unpolished appearance of a

Leucopaxillus. The vinaceous reaction of the flesh to iodine is sporadic, and, in a series of six mounts, was found to be unreliable. The spores nearly always appear slightly reticulate in mounts in iodine because the very thin wall tends to remain wrinkled in the immature spores, and these are usually very numerous in mounts from dried pilei. The large well filled out spores appeared to be smooth. The photograph was taken by Mr. Walters. The Ohio collection differed from the type in having deeply emarginate gills, paler flesh and slightly shorter spores. These characters may, along with a possible difference in habitat, eventually be found to distinguish a variety of the species. At present the differences are regarded as merely variations between collections. The difference in the color of the flesh may be only that between young and old specimens, and the slight difference in the length of the spores is hardly significant.

UNIVERSITY OF MICHIGAN,
ANN ARBOR, MICHIGAN
AND
CLEVELAND HTS., OHIO

CERCOSPORA ON MORINDA ROYOC

ANNA E. JENKINS AND CHARLES CHUPP

(WITH 1 FIGURE)

Two specimens of *Cercospora* on *Morinda Royoc* L. from Florida are available, and one from Haiti. Comparison of the fungus from these sources with type material of *C. Morindae* Syd.[1] on *M. tinctoria* Roxb. from Coimbatore, Madras Presidency, India, shows that the two are distinct species. The *Cercospora* from Florida and Haiti appears to be unlike any other species of the genus described on Rubiaceae. It is described as new, therefore, as follows:

Cercospora morindicola sp. nov. (FIG. 1)

Leaf spots subcircular to irregular, pinkish buff to orange cinnamon; fruiting amphigenous, chiefly epiphyllous, in more or less concentric arrangement; stroma medium dark, 30–80 μ; fascicles dense; conidiospores pale to medium dark, tortuous, septate, sometimes branched, 2.5–5 $\mu \times$ 10–60 μ; conidia subhyaline to pale olivaceous, obclavato-cylindric, very slightly attenuated, straight to mildly curved, 1–5 septate, base abconically truncate, tip obtuse to conic, 2.5–4 $\times$ 20–55 μ.

Caespituli densi, amphigeni praecipue epiphylli, in maculis subcircularibus vel irregularibus e roseo-alutaceis aurantio-cinnamomeis plus minusve concentrice dispositi, e stromatibus subfuscis 30–80 μ in diam. oriundi; conidiophori pallidi vel subfusci, tortuosi, septati, interdum ramosi, 2.5–5 μ lati, 10–60 μ longi; conidia e subhyalinis pallide olivacea, recta vel subcurvula, 1–5-septata, basi obconice truncata, apice obtusa vel conica, 2.5–4 μ lata, 20–55 μ longa.

Host: Leaves of *Morinda Royoc* L.

Distribution and specimens examined: Key Largo, Florida, 1931, M. F. Barrus; United States Plant Introduction Grounds, Coconut Grove, Florida, Feb. 13, 1941, J. E. Fennell *1345* (Type); Haiti, March 1920, E. C. Leonard *3195* (U. S. Nat. Herb. *1075461*).

[1] Sydow, H. Beiträge zur Kenntnis der Pilzflora des südlichen Ostindiens II. Ann. Myc. **12**: 485–590. 1914. Description on p. 490.

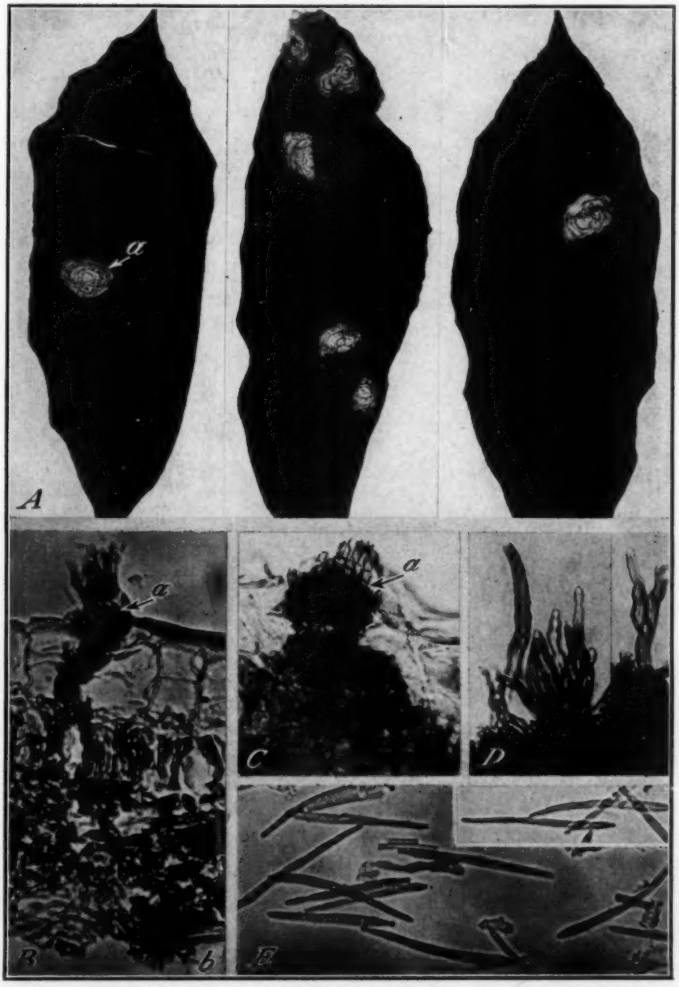


FIG. 1. *Cercospora morindicola* on *Morinda royoc*. Pine woods, Coconut Grove, Fla., Feb. 21, 1941, J. E. Fennell. *A*, three leaves showing leaf spots, fruiting arranged more or less concentrically, × 1; *B*, section through the leaf, fruiting shown at *a* and *b*, × 250; *C*, a large stroma, × 300; *D*, conidiophore fascicles; *E*, conidia, × 500; photographs by W. R. Fisher (*A* and *D*) and M. L. F. Foubert (*B*, *C*, and *E*).

The type specimen of *Cercospora Morindae* is at the Riks Museum at Stockholm, Sweden, where it was examined in 1938 by the junior writer, who already had been sent a fragment of the material. As compared with *C. morindicola,* this species produces large irregular to rust brown spots, with the fruiting plainly amphigenous. The stroma is pale, 10–30 μ; conidiophores are subhyaline to very pale olivaceous, plainly attenuated, straight, continuous and not branched, 2–3 $\times$ 5–15 μ, bearing cylindro-obclavate conidia 2–3.5 $\times$ 15–65 μ.

Relative to the host of *Cercospora morindicola* the following excerpt is filed with a specimen in the United States National Herbarium collected by A. H. Curtis:

"There is a shrub on the Keys and on the west shore of Bay of Biscayne called "Wild Coffee" but it is neither coffee nor (what I predicted) Glottidium, but a West Indian shrub in the Coffee Family named Morinda Roioc (a specimen of which will be in my next winter's fascicle of S. Florida plants). Although the people of that region call it Wild Coffee, yet the decoction of the leaves which they use they call tea. It is quite popular among the Coonties, but it is no better to my taste than many similar herb teas."

CORNELL UNIVERSITY,
ITHACA, N. Y.
AND
BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

THE GENUS PHAEOSEPTORIA ON GRASSES IN THE WESTERN HEMISPHERE [1]

RODERICK SPRAGUE [2]

(WITH 2 FIGURES)

Phaeoseptoria Speg. was described by Spegazzini (**6**, p. 39) in 1908 as follows: "*Char.* Est Septoria sporulis olivaceis distincta." In this new genus Spegazzini described one species, namely, *P. Papayae*. In 1909, Miyake (**3**, p. 136) described *P. Oryzae* on rice (in Japanese), and in 1910, he (**4**, p. 260) republished the description in German and added illustrations (**4**, *pl. 14, figs. 61–63*). In 1913, Saccardo and Trotter (**5**) recognized the genus and listed the two species, *P. Papayae* Speg. and *P. Oryzae* Miyake. In this connection, Saccardo and Trotter (**5**) amended the description of the genus *Phaeoseptoria* Speg. as follows: "Pycnidia subcutaneo-erumpentia, nigricantia, minuta. Sporulae bacillares v. anguste fusoideae, coloratae.—Est quasi Septoria sporulis olivaceis distincta." In 1925, Tehon and Daniels (**11**, p. 245) described and illustrated *P. Caricis* on *Carex* sp. from Illinois. The writer agrees with Saccardo's emendation and gives the following key to segregate *Phaeoseptoria* from certain other genera of the Sphaeropsidales:

A. Spores lengthened, at least 10 times as long as broad, usually at least 15 times as long..... (Scolecosporae)
B. Spores hyaline or chlorinous..... *Septoria* Sacc.
BB. Spores yellowish to light brown, usually stout, multiseptate..... *Phaeoseptoria* Speg.

[1] Coöperative investigations between the Divisions of Cereal Crops and Diseases, Forage Crops and Diseases, Dry Land Agriculture, Bureau of Plant Industry, Agricultural Research Administration, Division of Nurseries, Soil Conservation Service, U. S. Department of Agriculture, and the Oregon Agricultural Experiment Station. Published with the approval of the Director as Technical Paper No. 410. Contribution from the Department of Botany.

[2] Pathologist, Division of Cereal Crops and Diseases, Bureau of Plant Industry.

AA. Spores broadened, usually less than 10 times as long as broad, cylindrical to fusoid
B. Spores 1-septate ..... (Didymosporae)
C. Spores hyaline or yellow ..... *Ascochyta* Lib.
CC. Spores brown ..... *Diplodia* Fries
BB. Spores 2- or more septate ..... (Phragmosporae)
C. Spores hyaline ..... *Stagonospora* Sacc.
CC. Spores colored ..... *Hendersonia* Berk.

Phaeoseptoria, therefore, has longer and usually paler spores than *Hendersonia,* which is an affinity of *Stagonospora. Phaeoseptoria* is readily distinguished from *Septoria* by the black, heavy walled, scattered, not so often maculicole, subcutaneous, less often strongly erumpent pycnidia and the stout, multiseptate, lightly colored spores. The species discussed are as follows:

Phaeoseptoria Elymi sp. nov.

Maculis fuscis, pycnidiis sparsis, 180 μ, globosis, erumpentibus, brunneis, ostiolatis (8 μ); pycnosporulis fasciculatis, curvulis, nec recurvulis, bacillari-filiformibus, utrinque obtusatis, 8–14 septatis, fuligineis, 50–75 $\times$ 2–2.5 μ.
Hab. in foliis languidis, *Elymi virginici.* Calloway, Nebr.

This fungus was found on *Elymus virginicus* L. in Rev. J. M. Bates' collection No. 2601 at Calloway, Nebr., September 10, 1900, and which is filed in the Mycological Collections, Bureau of Plant Industry, Washington, D. C. This fungus is readily distinguished from the other species of *Phaeoseptoria* by the uniformly bacillar-filiform spores, which are blunt at each end and which scarcely taper and are not swollen at the ends as in some species (FIG. 2, *D*).

Phaeoseptoria Airae (Grove) and **P. Phalaridis** (Trail)

In a contemporary article (**9**) we have discussed *Septoria Bromi* var. *Alopecuri* Karst. The description by Karsten (**2**) led Trail (**12**) to believe that certain fungi he had seen were related to *S. Bromi* var. *Alopecuri.* Grove (**1**), followed Sydow (**10**) and used the name *S. Alopecuri* Syd., but otherwise followed Trail's (**12**) description. Grove listed *S. Alopecuri* as having hyaline to faintly yellowish spores 45–75 $\times$ 2.5 μ. *Septoria Alopecuri* var. *Airae* Grove was described as having fusoid, cylindrical, pale yellowish spores, 60–75 $\times$ 2.5 μ. *Septoria Alopecuri* var. *Phalaridis* (Trail) Grove (**1**) (*S. Bromi* var. *Phalaridis* Trail (**12**)) was described

as having spores 53–65 × 3.5–4 μ, 8–15 septate, and *S. Alopecuri* var. *Calamagrostidis* Grove as having yellowish spores, 40–100 × 3–4 μ, 3–13 septate.

The variety *Airae* has been seen (FIG. 1, *G*). The pycnidia are 130–192 μ in diameter and contain stout clavulate spores with pointed apices and rounded blunted bases. They are obscurely 9 to 10 septate, 51–56 × 3.0–3.5 μ and are the same as material on *Deschampsia caespitosa* (L.) Beauv. from Oregon (O.S.C. 809). This fungus is very clearly a species of *Phaeoseptoria* and should be known as **Phaeoseptoria Airae** (Grove) comb. nov.

W. B. Cooke collected material of a *Phaeoseptoria* on *Phalaris arundinacea* L. at Corvallis, Oreg. (O.S.C. *17*), which has stout sphaerical pycnidia composed of light golden brown, large celled mycelia from which cuspidate pycnophores arise from creeping hyphae (FIG. 1, *F*). The spores are 8 to 13-septate (FIG. 1, *A*), filiform, 70–90 × 2.5–4.4 μ, somewhat constricted at the septa. This fungus differs, therefore, in several respects from *P. Airae* and from any concept of *S. Bromi* var. *Alopecuri* Karst. It is similar to Trail's *S. Bromi* var. *Phalaridis* (**12**) although the Oregon material has longer spores. We are considering them the same species and propose **Phaeoseptoria Phalaridis** (Trail) comb. nov.

In connection with *P. Phalaridis,* we examined material of *Stagonospora arenaria* Sacc. on *Phalaris arundinacea* collected by Grove on the banks of the Usk River, England, August 20, 1929. This is not our concept of *Stagonospora,* but is closer to *Hendersonia crastophila* Sacc. The spores (FIG. 2, *F*) are brown, fusoid, elongate to clavulate, 40–50 × 2.9–4.2 μ, 6 to 7-septate. However, these spores are about 12 times as long as broad and technically this would place the fungus in *Phaeoseptoria.* This case simply emphasizes the complexity of the group and the need for flexible classification. The very large pycnidia (250 μ) are diffecent also from those in some collection of *H. crastophila.* Therefore, the spores are close to *Septoria Alopecuri* as interpreted by P. Sydow (**8**, **10**), but the pycnidia are not. On the basis of present knowledge, we place these fungi with spores 40–50 μ long in *H. crastophila* and not in *Phaeoseptoria.*

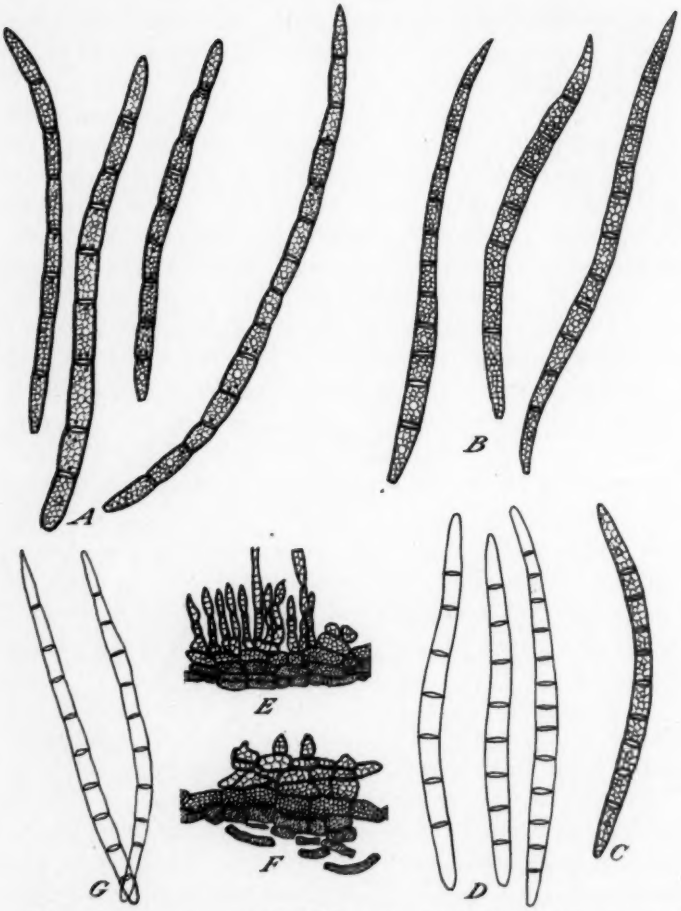


FIG. 1. *A*, pycnospores of *Phaeoseptoria Phalaridis* (Trail) Spr. on *Phalaris arundinacea* L., Corvallis, Oreg., O.S.C. *17*; *B*, pycnospores of *P. Festucae* Spr. on *Festuca rubra* L., Garibaldi, Oreg., O.S.C. *8376* (Type); *C*, pycnospores of *P. Festucae* on *F. rubra*, King's Valley, Oreg., O.S.C. *202*; *D*, pycnospores of *P. Festucae* var. *Muhlenbergiae* Spr., Lansing, Mich., H. H. Hicks No. *1211* (Type); *E*, segment of a cross section of the pycnidial wall of *P. Festucae* on *Festuca rubra*, Garibaldi, Ore., O.S.C. *8376* (Type); *F*, segment of a cross section of the pycnidial wall of *P. Phalaridis* on *Phalaris arundinacea* L., Corvallis, Oreg., O.S.C. *17*; *G*, pycnospores of *P. Airae* (Grove) Spr. on *Deschampsia caespitosa*, Sneyd's Coppice, Worcestershire, England, W. B. Grove, March 7, 1928. [All × 1000.]

Phaeoseptoria Calamagrostidis sp. nov.

Maculis stramineis v. nullis, pycnidiis rariis, nigris, 200 μ diam., erumpentibus, globosis, ostiolatis; pycnosporulis clavulato-filiformibus, aureo-brunneis, subvermiformibus, 5–11-septatis, 55–71 $\times$ 4.3–5.0 μ.

Hab. in foliis dejectis *Calamagrostidis nutkaensis* et *Agrostidis palustris* prope maris Pacifici Waldport et Newport, Oregon.

Spots few, scattered, straw colored or none, pycnidia few, scattered, black, heavy walled, subcutaneous, ostiolate, 200 μ diameter, pycnospores clavulate-filiform, somewhat vermiform with softly blunted ends, scarcely constricted at the septa, light yellow brown, 5 to 11-septate, 55–71 $\times$ 4.3–5.0 μ (FIG. 2, *C*).

In necrotic overwintered leaves of *Calamagrostis nutkaensis* associated with a multiseptate species of *Leptosphaeria* along the seashore at Waldport, Oreg. (Type, O.S.C. *354*) and on *Agrostis palustris* Huds., Newport, Oreg.

Efforts to locate *Septoria Alopecuri* var. *Calamagrostidis* Grove have been without success as reported earlier (**8**, **9**). It appears that proof of the existence of this fungus is lacking and that Grove's description (**1**) possibly may be based on a compilation. His drawing of this fungus is closer to *P. Phalaridis* (Trail) Spr. than the vermisporous *P. Calamagrostidis* which we have described above. It must be emphasized that Grove was probably dealing with a fragment just as our material of *P. Calamagrostidis* is such a fragment. This saprophytic, probably widely scattered but never abundant fungus is evidently of no economic importance and will be encountered only by students critically studying diseases of Gramineae.

Phaeoseptoria Festucae sp. nov.

Pycnidiis globosis v. subglobosis, nigris, subcutaneis, tarde ostiolatis, 55–100 μ lat. $\times$ 50–90 alt. (140–160 μ hab. *Danthonia*), contextu brunneo- parenchymatico, 13 μ crasso; pycnophoris pyriformibus, 3–4 $\times$ 1.4–1.7 μ; pycnosporulis 50–85 $\times$ 2.8–4.8 μ, 8–11-septatis, flavidis, clavato-filiformibus.

Hab. in foliis dejectis *Festucae rubrae* L. (typus) et *Danthoniae Parryi* Scribn.

Pycnidia globose to subglobose, black, suberumpent, sunken, tardily ostiolate, 55–100 μ wide $\times$ 50–90 μ high (140–160 μ diameter on Danthonia), walls 13 μ thick with an outer brown portion of closely woven elongated cells totalling 5–6 μ thick, inner hyaline layer (FIG. 1, *E*) radiating towards the pycnophores, which are 3–4 $\times$ 1.4–1.7 μ, pyriform, sometimes constricted at the base and

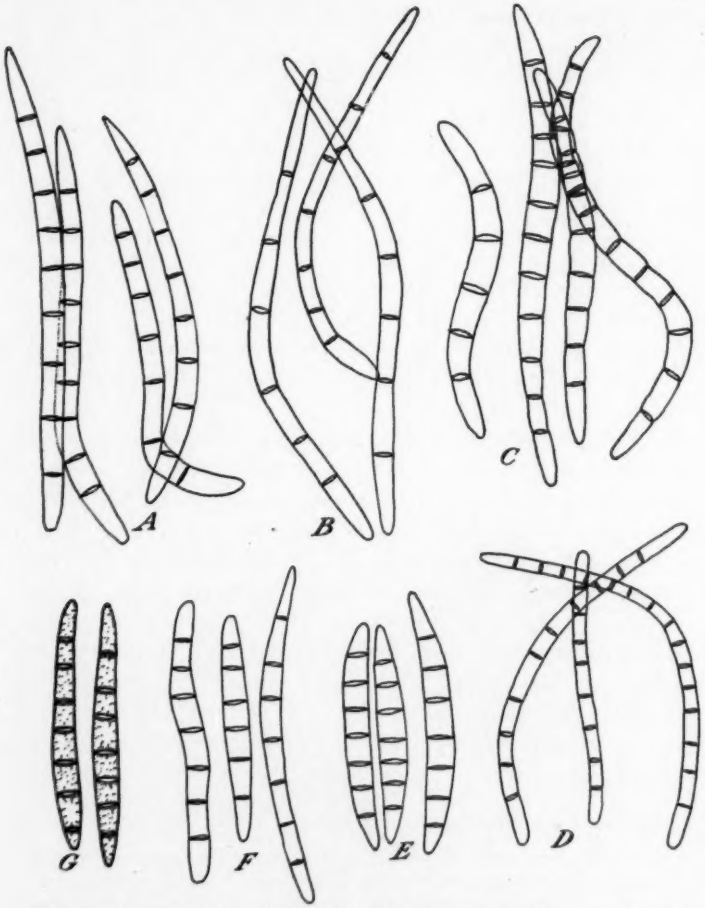


FIG. 2. *A*, pycnospores of *Phaeoseptoria Festucae* on *Danthonia Parryi*, Tolland, Colo., E. Bethel, Sept. 3, 1910; *B*, pycnospores of *P. Urvilleana* (Speg.) Spr. on *Panicum urvilleanum*, Argentina, from type of *Septoria urvilleanum* Speg.; *C*, pycnospores of *P. Calamagrostidis* Spr. on *Calamagrostis nutkaensis* Presl, Waldport, Oreg., O.S.C. *364* (Type); *D*, pycnospores of *P. Elymi* Spr. on *Elymus virginicus* L., Calloway, Nebr., J. M. Bates No. *2601*, Sept. 10, 1900; *E*, pycnospores of *Hendersonia crastophila* Sacc. on *Deschampsia caespitosa* Baxterley Common, England, W. B. Grove, Oct. 15, 1927; *F*, pycnospores of *H. crastophila* on *Phalaris arundinacea*, banks of Usk River, Brecon, England, W. B. Grove, Aug. 20, 1929; *G*, pycnospores of *H. crastophila* on *Festuca rubra*, Garibaldi, Oreg., O.S.C. *748*. [All × 1000.]

blunt at the apex; spores formed by elongation and later abscissing leaving a blunt base on the spore, spores 50–85 × 2.8–4.8 μ, 8 to 11-septate, flavid, clavulate-filiform with tapering finally blunt (narrowly truncate) base and tapering, pointed to slightly blunt apex (FIGS. 1, *B, C*; 2, *A*).

On languishing leaves of *Festuca rubra* L. at Garibaldi, Oreg. (type) (O.S.C. *8376*), facing the open sea, and at King's Valley, Oreg. (O.S.C. *202*); and on *Danthonia Parryi* Scribn., Tolland, Colo. (Bethel).

This is another obscure and economically unimportant semi-saprophyte. It has larger spores than *P. Airae* while the blunt base and sharpened apex of the spores distinguish it from *P. Calamagrostidis*. The method of spore formation and the lack of constriction at the septa distinguish it from *P. Phalaridis*.

At Garibaldi it is associated with the shorter spored *H. crastophila* (FIG. 2, *G*) (O.S.C. *748*).

Phaeoseptoria Festucae var. **Muhlenbergiae** var. nov.

Pycnidia associated with black lesions, scattered to subgregarious, prominent, suberumpent, black, subglobose, ostiolate, parenchymatous, 150–190 μ; pycnospores flavid, obclavate, 7–13-septate, bases obtuse, apices subacute, 47–64 × 3.7–4.5 μ.

Hab. in foilage of *Muhlenbergia mexicana* (L.) Trin., East Lansing, Mich., G. H. Hicks, No. *1211*. No date but old material in the undetermined files of the Mycological Collections, Bureau of Plant Industry, Washington, D. C.

This fungus is very close to *P. Festucae*, but differs in having larger pycnidia and lighter colored spores. The spores are yellow, not far removed from true *Septoria*, but the scattered stout structured pycnidia, and relatively stiff, coarse, if only yellow, spores place this fungus in our concept of *Phaeoseptoria* (FIG. 1, *D*).

The association of this fungus with the tar-spot lesions is confusing. C. R. Orton, in 1940 notations on the packet of Hicks No. *1211*, rejected this from *Phyllachora*. It is not quite clear whether our *Phaeoseptoria* is associated with the tar-spot lesions or is the cause of them. As mentioned, the pycnidia lie just outside of the tar-spot lesions. This variety appears to be more parasitic than the species proper.

Phaeoseptoria Festucae var. *Muhlenbergiae* is readily distinguished from *Septoria mississippiensis* Spr. by its multiseptate

spores but is less clearly distinct from the *S. Bromi* var. *Alopecuri* complex (**2**, **8**, **9**, **10**). The spores of the *Phaeoseptoria* are considerably stouter, however.

Phaeoseptoria Urvilleana (Speg.) comb. nov.

Among material very kindly finished to us by Juan Lindquist, Inst. Spegazzini, was a specimen of *Septoria Urvilleana* Speg. (**7**, p. 387), which now on aging has brown spores, clavulate-filiform, 20–90 × 4.5–6 μ. This fungus, on *Panicum Urvilleanum* from Argentina was described originally as having hyaline to faintly sub-chlorinous spores, but now appears to belong in Spegazzini's genus *Phaeoseptoria* to which we transfer it, as above recorded. This fungus differs from *P. Festucae* in having wider spores, but is more readily distinguished by the less stiff, more gracefully curved spores with only 5- to 7-septa.

The following key will aid in segregating the collections of *Phaeoseptoria* discussed in this article:

A. Spores filiform-bacillar.....*Phaeoseptoria Elymi* Spr.
AA. Spores clavulate-filiform
B. Spores yellow to light brown
C. Spores 60–75 × 2.5–3 μ.....*P. Airae* (Grove) Spr.
CC. Spores wider, 55–64 × 3.7–4.5 μ.....*P. Festucae* var. *Muhlenbergiae* Spr.
BB. Spores light brown, coarser
C. Spores 5- to 7-septate, 20–90 × 4.5–6.0 μ.....*P. Urvilleana* (Speg.) Spr.
CC. Spores 8- to 13-septate, narrower
D. Spores vermiform, obtuse, 55–71 × 4.3–5.0 μ.....*P. Calamagrostidis* Spr.
DD. Spores obclavate-filiform, scarcely vermiform, acute at one end or at least acuminate
E. Spores stiffly obclavate-filiform, apices acute, bases truncated, scarcely constricted at septa, pycnophores elongate.....*P. Festucae* Spr.
EE. Spores similar to above but somewhat constricted at septa, pycnophores broadened or obscure.....*P. Phalaridis* (Trail) Spr.

The aid of A. G. Johnson and Edith Cash in the final preparation of the manuscript is gratefully acknowledged.

NORTHERN GREAT PLAINS FIELD STATION,
MANDAN, N. DAK.

LITERATURE CITED

1. **Grove, W. B.** British stem- and leaf-fungi (Coelomycetes) Sphaeropsidales. 1, 488 pp. *illus.*, Cambridge. 1935.
2. **Karsten, P. A.** Symbolae ad mycologiam fennicam XVI. Medd. Soc. Faun. Fl. Fenn. **11**: 148–161. 1884.
3. **Miyake, I.** [Studies of fungi on rice in Japan.] Bot. Mag. (Tokio) **23**: 85–97; 127–145. 1909. (In Japanese.)
4. ——. Studien über die Pilze der Reispflanze in Japan. Jour. Coll. Agric. Imp. Univ. Tokio **2**: 237–276. 1910.
5. **Saccardo, P. A. & Trotter, A.** Sylloge Fungorum **22**: 1121. 1913.
6. **Spegazzini, Carlos.** Fungi Aliquot Paulistani. Rev. Mus. La Plata **15**: 7–48. 1908.
7. ——. Mycetes Argentinensis V. Anal. Mus. Nac. Buenos Aires II. **13**: 329–467. 1911.
8. **Sprague, R.** *Septoria* diseases of Gramineae in the western United States. (In ms.)
9. ——. The status of *Septoria Alopecuri* (Karst.) P. Sydow and some related species. Mycologia **35**: (in press).
10. **Sydow, P.** Beiträge zur kenntniss der Pilzflora der Mark Brandenburg II. Hedwegia (Beiblatt) **38**: 134–140. 1899.
11. **Tehon, L. R. & Daniels, E.** Notes on the parasitic fungi of Illinois II. Mycologia **17**: 240–249. 1925.
12. **Trail, J. W. H.** Revision of Scotch Sphaeropsideae and Melanconieae. Scot. Nat. (N.S. v. 3) **9**: 219–236. 1888.

PHOTOGRAPHS AND DESCRIPTIONS OF CUP-FUNGI—XXXVIII. THE GENUS KRIEGERIA [1]

FRED J. SEAVER

In 1878 Rabenhorst (Hedwigia 17: 32) established the genus *Kriegeria* founding it on his own species *Ombrophila ? Kriegeriana* (Rab. Fungi Eur. *2315.* 1878), but suggested changing the specific name to *olivacea* which change was unnecessary and, in fact, unwarranted under the rules. The species on which the genus was founded seems to be quite common in Europe, judging from the number of specimens in our collection. The plants occur on *Abies pectinata* and are characterized by their olivaceous color.

In 1931 the writer established the genus *Chloroscypha* on *Helotium Seaveri* Rehm, a species which occurs on foilage of *Thuja plicata.* This species is also characterized by the peculiar olive green color of the apothecia, which is more apparent when the apothecia are crushed. Both species are further characterized by the comparatively large fusoid to fusiform spores. The writer is convinced that the two genera are identical.

Dr. W. Lawrence White treats *Kriegeria* as a synonym of his genus *Rutstroemia,* but the writer believes that the plants which have been placed in *Kriegeria* and *Chloroscypha* should be retained in a separate genus under the earlier name *Kriegeria.* All the species referred to the two genera occur on foilage, twigs or branches of coniferous trees.

The writer, therefore, proposes that the genus *Kriegeria* be revived and made to include those forms placed by the writer in the genus *Chloroscypha.* The genus then would be as follows:

KRIEGERIA Rab. Hedwigia **17**: 32. 1878.

Chloroscypha Seaver, Mycologia **23**: 248. 1931.

For the characters of the genus see MYCOLOGIA reference above.

[1] For illustrations see previous papers on *Chloroscypha* (Mycologia **23**: *pl. 23, 24;* **30**: 595, *f. 1.*).

1. **Kriegeria Kriegeriana** (Rab.) comb. nov.
Ombrophila Kriegeriana Rab. Fungi Eu. *2315*. 1878.
Kriegeria olivacea Hedgwigia **17**: 32. 1878.
Ciboria Kriegeriana Rehm, Hedwigia **22**: 36. 1883.
Chlorosplenium Kriegerianum Sacc. Syll. Fung. **8**: 318. 1889.

2. **Kriegeria Seaveri** (Rehm) comb. nov.
? *Peziza enterochroma* Peck, Ann. Rep. N. Y. State Mus. **32**: 47. 1879.
? *Ombrophila enterochroma* Sacc. Syll. Fung. **8**: 619. 1889.
Chloroscypha Seaveri Mycologia **23**: 249. 1931.

3. **Kriegeria Jacksonii** (Seaver) comb. nov.
Chloroscypha Jacksonii Seaver, Mycologia **23**: 249. 1931.

Note: *Helotium limonicolor* Bres. Fungi Trid. *81*. 1898 resembles this species, except in color which is lemon yellow. It occurs on *Thuja orientalis* and doubtless belongs to this genus and may even be identical with the above. Without material it is impossible to decide.

4. **Kriegeria chloromela** (Phill. & Plow.) comb. nov.
Peziza chloromela Phill. & Hark. Grevillea **13**: 22. 1884.
Chlorosplenium chloromelum Sacc. Syll. Fung. **8**: 319. 1889.
Chloroscypha chloromela Seaver, Mycologia **23**: 250. 1931.

5. **Kriegeria juniperina** (Ellis) comb. nov.
Dermatea juniperina Ellis, Am. Nat. **17**: 192. 1883.
Chloroscypha juniperina Seaver, Mycologia **23**: 180. 1931.

6. **Kriegeria cedrina** (Cooke) comb. nov.
Peziza cedrina Cooke, Buffalo Soc. Nat. Sci. **2**: 294. 1875.
Lachnella cedrina Sacc. Syll. Fung. **8**: 395. 1889.
Chloroscypha cedrina Seaver, Mycologia **30**: 594. 1938.

NEW YORK BOTANICAL GARDEN